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TRANSACTIONS

OF THE

PROVINCIAL MEDICAL AND SURGICAL ASSOCIATION.

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INSTITUTED 1832.

VOLUME XV.

LONDON:
J. CHURCHILL, PRINCES STREET;
SHERWOOD, GILBERT, AND PIPER, PATERNOSTER ROW;
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AN

EXPERIMENTAL INQUIRY

INTO THE

EFFECTS OF HYDROCYANIC ACID,

PRODUCED UPON

ANIMAL LIFE.

BY THOMAS NUNNELEY, ESQ., F.R.C.S.E.,

Surgeon to the Leeds Eye and Ear Infirmary, and Lecturer on Anatomy in the Leeds School of Medicine.

Though the deadly effects of hydrocyanic acid upon animal life have been for so many years known to the profession, and the facility with which it may be used as an instrument of destruction by the suicide or murderer fully recognized, it is only within a comparatively recent period that the public have become sufficiently familiar with its properties to choose it as a means of death in preference to the other methods of getting rid of life. The knowledge, however, which had been gradually, but surely, becoming widely distributed, has within the last two years, in consequence of the great publicity and notoriety given by the journals and newspapers to two or three trials where the acid had been the cause of death, (particularly those of Belany and Tawell,) been so forced upon every person, that a sort of popularity has been given to hydrocyanic acid; and for the future, or, at least, for some time to come, we may expect to meet with many cases in which it has been used. It appears, indeed, by no means improbable that it may as frequently be employed as arsenic and other mineral preparations, and it becomes, therefore, of the utmost importance to determine the precise effects of it upon animal life; whether these

are always uniform or not; what dose may destroy life; if the same dose always produces the same effects; if the effects vary according to the quantity taken, or to the manner and mode in which it is exhibited; if the degree of concentration or dilution alters the effects, and if there be any means of counteracting its action—if so, if we are to look for an antidote to the poison, or only to a remedy for the effects of it;—if to an antidote, what is the most potential; if to a remedy only, which should be selected. In fact, when called to a person suffering from the effects of a poisonous dose of hydrocyanic acid, what is to be done? Though many experiments have been made, and many cases of poisoning by hydrocyanic acid have been reported, it will, I apprehend, be readily admitted by every one who has attended to the subject, that upon some of these points the evidence is most contradictory, while upon others scarcely anything more than conjecture is known. If there be any who doubt this, I would refer them to the reports of the two trials above alluded to, and to the most recent works upon poisons for the truth of it.

Some years ago I made many experiments upon animals, (at the time of the trial of the druggist at Leicester, in 1829,) and at various times since. I had given the acid to different animals without, however, having arrived at any definite result, when last year, soon after the trial of Tawell, and occasioned, I have every reason to believe, by the parties reading and dwelling upon that, I witnessed within a few days of each other two cases in which hydrocyanic acid had been taken for the purpose of self-destruction. In one, the person after I had been with him some time, died;* in the other, the man recovered, having taken the largest known dose of any one who has recovered.† In both the effects were so different in many particulars from what was commonly believed to be produced by hydrocyanic acid, that I was strongly impressed with the importance of something more certain being known. Soon after this, circumstances enabled me to institute an extended series of observations upon dogs. I determined to endeavour, if possible, to obtain more precise information upon the foregoing questions. The number of experiments made upon dogs is eighty, and upon other creatures (vertebrata and

* *Provincial Medical and Surgical Journal*, July 23, 1845.

† *Provincial Medical and Surgical Journal*, August 13, 1845.

invertebrata,) still greater. To these I have added some made upon plants. I am aware it may be objected that the effects of the acid upon animals is different from what it is upon man. To this objection I attach little value, as from what I have seen of the effects of the acid upon warm and cold-blooded animals, as compared with what I witnessed in the two cases of poisoning which I have seen in men, and the accounts of other observers, as well as from analogy, I believe the action is essentially the same upon all, and that inferences drawn from experiments upon animals, of which the dog, from his not very dissimilar organization and diet is, perhaps, as favourable, if not more so, than most others, if fairly deduced, are in their application to man to be relied upon.

I shall, in the first place, put before the reader as concise an account as possible of many of the experiments, from which he can draw his own deductions. I shall then venture to add the conclusions which I have drawn from them. It may be stated, that during each experiment an assistant was present, who, like myself, was provided with a watch. He was placed at a table with pens and paper, so that each observation was recorded at the moment it was made. This will account for some of the expressions used. Some may think the time is stated with unnecessary precision and minuteness, but it must be borne in mind that the exact period at which effects are produced is not only one upon which there is the greatest contradiction, but which is one of the most important. In all cases where the strength of the acid employed is not mentioned, it was Scheele's. This I selected as that most generally met with in this country, and consequently of the strength most likely to be employed in poisonous doses by the public. It also is of a convenient degree of dilution. The acid used in many of the experiments was obtained from Allen and Co., Plough Court; in the remainder, from Gale, Baker, and Co., Bouverie street. In both cases it was recent, as I am informed by both was of the exact strength of Scheele's acid, viz., five per cent. of real acid, and I did not observe any difference in the effects. The strong acid I made by distilling at a low heat ten drachms of Scheele's acid, until two drachms had passed over into a receiver kept constantly as cold as possible; it, therefore, should be equal to twenty-five per cent. of real acid, or four drops to one of anhydrous

acid. Throughout the following pages I have purposely not made any reference to the experiments of others, not that I undervalue them, but my object was to experiment for myself, and not merely to echo those of others; besides this, I must, in truth, add that it was not until some time after the whole of those upon the dogs had been made that I had seen the account of the longest set of experiments with which I am acquainted—those of Dr. Lonsdale. Though some of his and mine are somewhat like, his object was, in a great measure, different from mine, not nearly so extensive, and from some of his opinions upon a most important point I differ materially.

No. 1.—Strong, rather large, mongrel bitch (old). Gave two drachms of acid: in twenty-five seconds she fell, struggled hard, and howled very little; eyes prominent and pupils excessively dilated; mouth intensely red; jaw rigid and closed until one minute, when it fell, and the muscles became relaxed; heart ceased to beat in two minutes and a-half; during the last minute the dog had scarcely moved or breathed.

No. 2.—Full-grown rough terrier dog. Gave one drachm of acid: he ran about distressed, staggered and fell backwards in thirty seconds, limbs very rigid and stretched out; eyes exceedingly prominent and pupils dilated; mouth very red; one minute and a half flaccid; heart continued to beat exceedingly quick and very feebly until three minutes; there was no other sign of life after one minute and a-half.

No. 3.—Strong terrier dog (old). Gave one drachm of acid: he ran away, fell in twenty-five seconds, struggled for one minute, then lay still till three minutes, when he moved once; heart ceased to beat at five minutes, having breathed only three or four times; neither urine nor fæces passed; no noise made.

No. 4.—An active half-bred small terrier. Gave forty minims of acid: it ran about, wagged its tail when spoken to, and followed the man about the room; fell backwards in one minute and a-half; convulsed, but no rigidity; mouth open, tongue protruded, and quite scarlet; dead in three minutes and a half; no howling.

No. 5.—Gave forty minims of acid to a fat spaniel dog, of moderate size: he licked his lips and stood still, as though

confused and stupid; respiration short and hurried; the eyes immediately started and became prominent, with the pupils much dilated; he soon staggered and fell backwards; jaw fell and tongue protruded; fæces passed, but not urine; he was convulsed, but not violently so; no indication of life after three minutes; there was no howling, and he scarcely moved from the spot where the acid was given.

No. 6.—Strong dog. Gave thirty minims of acid, not quite the whole swallowed: he ran bounding off, wagging his tail, playing, and following a person who ran quickly about the room calling him for thirty seconds, then fell; urine passed; no noise; mouth intensely red; continued rigid and convulsed for two minutes; did not stir nor breathe afterwards; heart continued to beat feebly until five minutes, and even for ten minutes more could be felt feebly fluttering.

No. 7.—Small mongrel (young). Gave fifteen minims of acid by mouth: it ran quickly away for about fifteeen yards; suddenly stopped, stood still for a second, then fell backwards; struggled, but not greatly, and howled a little; ceased to breathe in three minutes, heart to beat in five; neither fæces nor urine passed.

No. 8.—A mongrel terrier, not fully grown (not so large as No. 70). Gave six minims of acid: in fifteen seconds it fell; urine passed; pupils dilated; mouth not very red; in ten minutes heart ceased to beat.

No. 9.—Small mongrel terrier bitch. Gave ten minims of acid: pupils almost instantly became widely dilated; in one minute fell backwards, perfectly rigid; mouth widely open, tongue protruded; heart acted with a sudden jerking beat thirty-five per minute: no appearance of life two minutes and a quarter after taking the poison.

No. 10.—Small mongrel bitch in pup. Gave ten minims of acid: soon affected; howled very little; in five minutes passed urine and fæces; in forty minutes heart ceased to beat; she lay still, at first breathing very slowly, then quickly.

No. 11.—Very large Newfoundland bitch. Gave three minims of strong acid, equal to fifteen of Scheele's, by mouth: in thirty seconds, breathed quickly and staggered; forty-five seconds, struggled hard; pupils not much dilated, purged; one minute and three quarters, strong convulsions; four minutes, able to support herself upon legs

when put up, and to crawl a few paces; pupils more, but not excessively dilated; seven minutes, respiration very rapid; nine minutes, able with assistance to get up and walk; passed urine freely; fifteen minutes, walks about, not much affected—did not lose consciousness. Gave three minims more of the strong acid by mouth: in forty-five seconds she fell, and struggled much; again purged; takes no notice of patting this time; lay about eight minutes, breathing slowly, without any other motion, when respiration became very rapid; twenty-four minutes, after lying until now, with hardly any motion, has got up and walked away perfectly conscious, and but little affected in the limbs. Thirty minutes, gave three minims more of strong acid by mouth; thirty seconds, fell; one minute, again purged; ten minutes, all consciousness and reflex action lost; twenty-five minutes, lies in the same state, perfectly still and powerless, but appears likely to continue. Put two minims into the eye, (twenty-five minutes after third dose and fifty after first); in thirty seconds, respiration deeper, about five per minute, then rigid; *pupils quite contracted;* again purged; did not breathe in two minutes and a-half after the acid had been put into the eye.

No. 12.—Same bitch as No. 40, to whom the acid twenty-four hours before had been given per vaginam. She continued dull, weak, and cold for some hours, with the saliva dribbling from the mouth, but now appears to be quite recovered; six minims, given by the mouth; while giving it she passed urine, apparently from fear and struggling; when set down she instantly ran quickly about and licked the vagina; in twenty-five seconds the breathing became quick; she then staggered, and fell in thirty seconds, lay still until one minute and a-half, then howled and lay still; at two minutes and a quarter she vomited thick frothy mucus, and soon recovered. Twelve minutes after, six minims more given; in twenty seconds she howled very loudly and struggled hard for one minute, then lay perfectly still; at six minutes heart ceased to beat.

No. 13.—Gave to a rather large, rough-haired terrier bitch, twenty minims of the same acid as that taken by Jackson, whose case I have reported in the *Provincial Medical and Surgical Journal,* for August 13, 1845, (sold as Scheele's, but containing three and a quarter per cent. of real acid.) She ran about for a minute and a-half, staggered, and then fell backwards; limbs convulsed;

pupils not excessively dilated until near death, the degree of dilatation, however, varied much; at five minutes after the acid had been given there was not much dilatation; urine, but not fæces, expelled; mouth open, tongue red and protruded; lived at least ten minutes; at first was rigid, then relaxed, again rigid, and before death perfectly flaccid; she began to breathe more freely, and seemed so to revive that I thought she would recover, but she died quietly; no howling.

No. 14.—Gave twenty minims of same acid as No. 13 to a small, half-grown mongrel dog: it licked its lips, ran about, and followed the attendant for a minute; fell forwards upon belly, with fore legs stretched out; no rigidity; mouth open; tongue protruded, but not very red, though the fauces were; eyes not very prominent, pupils dilated; howled, voice natural; urine passed; dead in two minutes and a half.

No. 15.—Moderate sized mongrel bitch. Gave one drachm of acid in two drachms of water; not more than half swallowed, being retained in fauces, as though these were completely paralyzed: dropped down without stirring; did not move until one minute and a-half, when she breathed; mouth not so red as usual; pupils dilated, but eyes not very prominent; heart ceased to beat in three minutes and a-half; the only other signs of life after the acid was given being one or two inspirations; no howling.

No. 16.—Small well-bred rough-haired terrier bitch. Gave forty minims of acid in four drachms of water; about a fourth part of it lost: ran about, but fell in about the same time as No. 4, (one minute and a-half;) much convulsed and rigid; body drawn forwards and the legs together; pupils not much dilated until near death, when they were fully so; eyes apparently not sensible to light, but the reflex action perfect, for when the cornea was touched winking was instantly induced; fæces expelled in small quantity; urine not, but the man said that she had passed water just before the acid was given; lived seven minutes and a half; no howling.

No. 17.—Small, half-bred, terrier bitch. Gave thirty minims of acid in two drachms of water; not more than half was swallowed: she ran some little distance under a form and fell backwards; howled much in a natural voice; mouth open and red; tongue out; pupils at first not much dilated, but afterwards excessively so; breathed

convulsively; heart at first beat slowly and convulsively, then quickly, at least 100 per minute; urine not expelled until shortly before death; lived nine minutes and a half; limbs before death as flaccid as possible, indeed, in most they became so.

No. 18.—Half-grown terrier. Gave ten minims of acid in one ounce of water: it fell instantly, without a struggle; mouth open, but not red; eyes not prominent, pupils dilated; at one minute and a-half breathed very slightly. This was the only indication of life, even the pulsations of the heart being scarcely perceptible.

No. 19.—Strong rough-haired terrier bitch. Gave fifteen minims of acid diluted with three drachms of water, introduced by means of a funnel into the vagina; only a small quantity remained: she ran about, but the hind legs were weak; there was no convulsion nor loss of consciousness; in five minutes, she vomited some thick white frothy mucus. Seemingly being perfectly well in fifteen minutes, I introduced two drachms of undiluted Scheele's acid into the vagina; she ran about, and once or twice licked the vagina; the hind legs almost immediately became very weak, and were dragged; she soon staggered; in one minute, the respiration was hurried; the mouth open and red, tongue protruded; eyes prominent, pupils dilated and insensible to light; fell in one minute and a-half; rigid for a minute, then perfectly flaccid; no motion, except slow and convulsive respiration. At the moment of inspiration the limbs were moved, especially so at six minutes, which was the last inspiration; heart continued to beat for two minutes more; both urine and fæces expelled. In this case the eyes were not so prominent, nor the pupils so much dilated, as often. The redness of the mouth evidently, in a great degree, depends upon two causes,—one the violent contraction of the muscles, for as soon as the rigidity ceases the redness in part disappears, being congestion—the other the local action of the acid, which acts by inducing dilatation of the blood vessels—stimulant?

No. 20.—Small terrier bitch, same size as No. 27. Gave thirty minims of acid per vaginam. The mouth was tied up with a piece of string, to prevent it biting; when set down it tried hard to get the string off with its feet; one minute, respiration very hurried; one minute and a half, passed urine very freely; at two minutes, introduced six grains of nitrate of silver in two drachms of water

into vagina; she became rigid, and lay with little sign of life; in four minutes, began to breathe slowly and deeply; strong liquor ammoniæ held to the nostrils; respiration more rapid, with rigidity; in seven minutes gave twenty minims of liquor ammoniæ in two drachms of water; nine minutes, heart ceased to beat, there being no other sign of life after seven minutes; pupils were not excessively dilated nor eyes very prominent or red; no howling.

No. 21.—Rough-haired otter dog, rather less than No. 19. Introduced fifteen minims of acid into the rectum: he ran about, hind legs soon became weak; staggered and fell in one minute; howled, but not so much as No. 19; respiration very hurried; tongue protruded; mouth open and red; after two minutes limbs ceased to be rigid; heart ceased to pulsate in six minutes; gave no indication of feeling when pricked by pins.

No. 22.—Mongrel dog, same size as No. 40. Gave six minims of acid in one drachm of water, by the rectum: he ran about as though nothing had happened; in two minutes fell, tried hard to get up again; whined, and moaned as though distressed from weakness but not in pain; sooner and more affected in the hind legs than in the fore legs; three minutes, pupils excessively dilated; twenty-five minutes, breath smells of the acid; thirty-five minutes, strabismus; thirty-seven minutes, slight convulsions, urine expelled and heart immediately ceased to beat. This dog continued to breathe freely until just before his death, and appeared to be improving; he was not sensible, and appeared to be in deep sleep, with the limbs powerless. I thought he would recover. He was not an old dog.

No. 23.—A very strong bull-terrier bitch (suckling). Cut a portion of the skin of the size of a sixpence out of the middle of the back, by means of a pair of sharp strong scissors; wound scarcely bled; dropped into it two minims of strong acid, equal to ten minims of Scheele's: in two minutes and a-half she passed urine, but was in no other manner affected; ran and jumped about, very pleased to be noticed; eighteen minutes, put into the wound two minims more of the strong acid, without the least effect, (she paid not the smallest attention to the wound, as though it were not felt;) thirty minutes after put upon the tongue

three minims of the strong acid; fifteen seconds, affected; thirty seconds, fell, struggled hard, then lay perfectly still, breathing slowly; four minutes, breathes quickly; eighteen minutes, conscious, but unable to stand; twenty-five minutes, breathes naturally and is recovering, though not able to use limbs; put two minims of strong acid into the eyes; twenty seconds, affected, breathing very quickly; forty seconds, rigid, fæces passed; two minutes, unconscious, reflex action lost, lay perfectly still; thirteen minutes, heart ceased to beat, there not having been respiration nor other sign of life for the two previous minutes.

No. 24.—A moderate sized, rough-haired terrier bitch, in pup. Put two minims of strong acid—equal to half a minim of real acid—to ten minims of Scheele's, into the eye: she ran down three steps and up again; twenty seconds, fell, howled very much, but struggled little; mouth, tongue, and eyes as usual, except, perhaps, mouth not quite so red. The eye into which the acid has been dropped is much more prominent, and the pupil much more dilated than the other eye; lay quite still until four minutes, when there was a strong convulsion,—again still; heart ceased to beat at eight minutes, there having been no other indication of life for two minutes before.

No. 25.—Same bitch as No. 71, after she had apparently lost all effects of previous dose. Gave five minims of acid by right eye: the pupil became instantly dilated; forty seconds, fell and howled excessively; mouth not red; breathed quickly, with rigidity of muscles, for one minute and a half; respirations then became less frequent, and for two minutes she lay as though dead; at eight minutes there was one convulsion, and heart ceased to beat in ten minutes. The dose by the eye produced much more decided effects than that by the mouth. Neither fæces nor urine passed, but these had been very freely evacuated shortly before.

I arranged a coil galvanic battery in good action ready to apply instantly.

No. 26.—An average sized mongrel terrier. Gave fifteen minims of acid: almost immediately respiration became hurried and it staggered; in less than a minute it fell; mouth open and red; tongue protruded; eyes prominent and pupils dilated; no howling;

galvanism applied immediately it fell; muscles all rigid; urine passed; heart ceased to beat in five minutes; the jaws opened and shut, as did the eyelids, as the connection of the wires was made and broken. In fifteen minutes the battery produced very little convulsion, the rigidity not having extended beyond the head after the first twelve minutes; one pole was applied within the anus, the other within the eyelids, ear, mouth, fauces, or nostrils; the appearance of life, beyond the convulsions ordinarily produced by the battery, did not continue longer than where nothing is done. In twenty minutes scarcely any effect was produced,—not nearly so much as in No. 29. In two hours not the least effect, at which time the jaws were very firmly fixed, and the muscles, especially those of the back, were excessively rigid. There was no howling.

No. 27.—Small terrier bitch. Gave thirty minims of acid in two drachms of water: she only moved a step or two, seemed paralyzed at once; howled slightly; galvanism applied in thirty seconds; muscles instantly very rigid; eyes excessively prominent and red, as was the mouth; so long as the connection was maintained the jaw was closed, when broken, it fell; urine expelled during rigidity, at two minutes and a half; heart ceased to beat in five minutes.

No. 28.—A very large strong savage bull bitch; she had pupped about sixteen hours before. She was so strong and violent that she had knawn through an inch and a-half plank to which she was fastened. Gave fifteen minims of acid in two drachms of water; not quite the whole was swallowed: when set down she fell, but immediately got up again, hung her head, breathed quickly and hard, ran about, staggered, and fell forwards; she tried hard to get up, but could not raise herself; she then fell upon the side and was still; galvanism applied in less than a minute. This rendered the muscles stiff and rigid, especially as the connection was made; pupils not fully dilated; head drawn backwards, and the mouth shut and opened as the connection was made and broken; respiration very quick and sighing; in two minutes she evidently felt the galvanism: the jaws were so firmly closed upon the wire that it could not be withdrawn while the connection was kept up; in four minutes she could see the wires, she tried to move the head away as they were brought near; in eight minutes she was able to get up, she walked about a yard and then stood still, as though she was afraid of falling, being scarcely able to

keep upon the limbs, but she was perfectly conscious and wagged the tail when spoken kindly to; she was very watchful and cautious; water was offered her but refused; a spoonful was now dashed in the face; she immediately voluntarily passed a large quantity of urine (she had not passed any previously,) and avoided any more water being dashed upon her; in ten minutes she walked about the room; respiration continued quick and laborious. I could not ascertain the state of the heart, as she was too savage to be handled; in a quarter of an hour she was perfectly recovered. I now tried to give ten minims of acid in three drachms of water, but not more than half of it was swallowed, as she struggled so violently; in a minute, she fell, and tried hard to rise but could not. Subjected to galvanism: muscles became rigid; heart's action feeble, and it soon ceased to beat; in six minutes only a little motion of the head and neck could be induced by the battery, and at the expiration of twelve, none; a little nodule of fæces passed; no howling.

No. 29.—A springer dog, same size as No. 26. Gave fifteen minims of acid at the same moment: it howled, staggered, and fell in less than a minute; urine expelled; mouth, eyes, and tongue as usual; still and motionless in two minutes; nothing done for twenty minutes, when galvanism was applied, as in No. 26; much more decided convulsions were produced than at the same period in No. 26; in another hour no effect was induced; after two hours only just becoming rigid.

No. 30.—Large mongrel dog (old and savage). Gave fifteen minims of acid in two drachms of water; nearly, but not quite, the whole swallowed: it soon fell; mouth open, tongue protruded; eyes prominent, pupils dilated; galvanism applied in less than a minute after acid had been given; immediately became rigid, and jaw closed; much mucus and foam at mouth; respiration hurried; urine expelled and a small bit of fæces; after six minutes no general convulsions, and heart ceased to beat; after twelve minutes galvanism did not produce the least effect; the muscles of the jaw and back remained very rigid.

No. 31.—Gave forty minims of acid to a black and tan terrier, of same size as No. 5, but not nearly so fat: it ran away to a corner of the room; respiration short and panting; staggered and fell

backwards; eyes prominent and injected, pupils dilated; shrieked loudly; jaw fell; tongue protruded; whole mouth very red; convulsed much more than No. 5; in four minutes it lay as though dead, except that the heart pulsated; head and neck plunged in cold water, it instantly breathed convulsively, and heart acted more vigorously, but the effect soon ceased, and although the plunging was several times repeated, after the second time no effect was produced by it; before death, and after the water ceased to produce any change, I opened a blood-vessel in the hind leg; the blood did not flow freely, no effect was perceptible from it; I thought life was prolonged by the cold plunging.

No. 32.—A rather small, half-grown mongrel. Gave fifteen minims of acid: it ran about for twenty seconds, but was unsteady; staggered and fell forwards; mouth intensely red; tongue out; pupils dilated, but not excessively so; seemed dying, when the head was plunged in cold water, it instantly breathed convulsively, the head was drawn backwards, and it howled in an unnatural voice. The effect of the water soon ceased; plunged successively three or four times, but no effect after the first time was produced; perfectly still in two minutes and a half, and soon afterwards the heart ceased to beat; urine expelled, but not fæces.

No. 33.—A large mongrel dog, in very poor condition. Gave thirty minims of same acid as Mr. A——— took:* immediately he was let loose he ran to a bitch, No. 76, in the room, who was in heat, and licked the vagina; not the least effect produce by the acid; fifteen minutes after, gave forty minims of the same acid; no effect; twenty-five minutes,† having no more of the acid left, gave thirty-five minims of the Kirkstall‡ acid; he fell in forty seconds; struggled hard to get up; howled a little; convulsed, but not violently; mouth very red; six minutes, respiration rapid, upwards of one hundred inspirations per minute; eight minutes, head placed under a stream of water without effect; on being placed upon the legs slips down upon the belly, the legs slipping out extended and powerless; perfectly sensible; threatened to be beat

* See case reported in the *Provincial Medical and Surgical Journal*, July, 1845, p. 461.

† This acid had remained in the possession of Mr. West; it had been excluded from the light, and was perfectly limpid.

‡ *Provincial Medical and Surgical Journal*, August 13, 1845.

violently with a piece of rope, and struck several times gently; though he sees the blow coming, and from his looks fears it, yet is unable to make the least effort to avoid it; eleven minutes, gave one drachm and a half of liquor ammoniæ fortis in one ounce of water; no effect; eighteen minutes, purged; twenty-two minutes, vomited a very large quantity of thick, frothy, slimy mucus; thirty minutes, having sufficiently recovered to move the limbs, though still unable to rise, (he had not lost sensation,) I gave ten minims more of the same acid; twenty seconds, struggled hard and passed urine, then convulsed for four or five seconds, afterwards muscles relaxed; three minutes and a-half, does not appear to retain sensation, but reflex action is not lost; nine minutes, lies perfectly helpless, and reflex action is nearly lost, pulsations of heart scarcely to be felt; died soon after.

No. 34.—Strong rough-haired, cur. Gave ten minims of acid: in thirty seconds, it fell backwards; in one minute, repeatedly dashed cold water upon him; convulsed, but not greatly, during one minute, then lay perfectly still, even respiration not perceptible, until five minutes; eight minutes, one long continued convulsion; until now had been perfectly motioness, except breathing deeply; thirteen minutes, heart ceased to beat; small portion of fæces passed, but no urine; did not howl.

No. 35.—A good-sized mongrel bitch, but not fully grown. Gave six minims of acid: she ran about, and fell in twenty seconds; mouth very red; pupils excessively dilated; thirty seconds, plunged into cold water; did not stir after forty seconds, though plunged repeatedly in the water; heart ceased to beat in five minutes; urine expelled, but not fæces.

No. 36.—A large bull-terrier dog. This was a most violent and ferocious brute, and one of the strongest dogs for his size I ever saw. The only way to hold him was by a pair of tongs with circular ends, which fitted round his neck: his mouth was forced open, and fifteen minims of Scheele's acid put into it. This took effect immediately; he did not move from the spot, but fell and struggled; breathed hard and quick; tongue protruded; mouth open and red; eyes prominent, pupils dilated, but not excessively so; heart beat vigorously; the limbs rigid; in five minutes he breathed better, and the muscles became relaxed; water now thrown in the face, and I thought he would recover; he continued to

breathe slowly, at intervals of about twenty-five seconds; water dashed in the face four times; he attempted to howl, but could not; pupils not so much dilated. He lived twenty-three minutes, the pulsations of the heart ceasing to be perceptible for at least three minutes before respiration ceased; the pupils were now excessively dilated. For a quarter of an hour I thought he would rally, and would have put his head into water, but he was so savage a brute that none dare touch him, lest he should suddenly recover; sensation was lost, or nearly so, for he gave no indication of it when pricked with a sharp point, but reflex action remained; a small nodule of fæces passed; not any urine, but this was passed just before acid was given.

No. 37. — Small full-grown mongrel spaniel dog. Gave five minims of acid by the mouth: in thirty seconds it fell, when it was placed under a cold water tap for ten seconds; howled loudly while under the douche, then lay as though dead; at two minutes, breathed for the first time since it howled once; at four minutes douched again, when it instantly became rigid, but perfectly flaccid on removal; at six minutes and a-half the heart ceased to beat.

No. 38.—Strong, smooth-haired terrier dog. Gave ten minims of acid in an ounce of water: thirty seconds, vomited; one minute and a quarter, turned round several times in succession, apparently dizzy; two minutes and a-half, passed urine, ran about for some time; six minutes and a-half, again vomited freely; eight minutes, unable to stand; passed urine again; muscles rather rigid and convulsed; ten minutes, cold water dashed upon him; when he got up, ran away, jumping over No. 78, and went staggering about, getting into the corners of the room; thirteen minutes, again vomited,—recovering. At half-past three p. m., nine hours and a-half after acid had been given, appears to be perfectly well. Gave thirty minims of acid in an ounce of water: he ran about the room, and *jumped across the top* of an open staircase; thirty seconds, fell and struggled hard to rise; rigid, with head drawn forwards; for one minute and a-half, *jaw firmly closed* until four minutes, when he vomited, and the muscle became flaccid; matter smelt strongly of acid; died at fourteen minutes, having only breathed a few times during the last few minutes; urine and fæces both passed.

No. 39.—Small mongrel spaniel dog. Gave ten minims of acid diluted with four drachms of water; the whole not swallowed, being retained in fauces, when let loose it came out: he ran about; respiration soon became hurried; in one minute and a-half, fell backwards and became rigid; howled slightly; mouth open, tongue protruded. In giving the acid the mouth was slightly wounded with the funnel; the blood was of a brick-red appearance; two minutes and a-half, limbs became flaccid and motionless; urine passed; respiration hurried and convulsive; twenty-five minutes, convulsed; lies with head thrown back; pupils rather contracted; perceives the light when the candle is held close to the eyes, but gives no indication of feeling; forty minutes, pupils less contracted; respirations, seventy-four per minute; lies perfectly still, as though in a deep sleep; forty-five minutes, pupils not now dilated; gave a good shaking, which roused him, and dashed water into the face, licked the lips; fifty-five minutes, put some water into the mouth, which was swallowed and induced coughing; at one hour the limbs continued perfectly paralyzed; no indication of sensation when pricked, but appears to hear a noise; sixty-five minutes, being supported, able to stand; moans feebly; is quite conscious; seventy minutes, has walked about two feet with great difficulty, the hind legs being wide apart and the fore doubled up, not having any command over them; seems perfectly aware of its feeble state, and likes to be petted; during the night it crawled about, but was unable to stand; seemed very cold, and sought warmth; was, during the night, two or three times seized with violent tremblings; would neither eat nor drink, but water was poured into the mouth two or three times, which it swallowed; the jaw was rigid. — Twenty-four hours after, is quite sensible and lively but is unable to stand; legs appear paralyzed; can crawl two or three yards upon belly. Subjected to the galvanic battery, when it seemed to move better, but it did not enable it to stand. I now gave it fifteen minims of Scheele's acid, when it immediately *ran about,* and fell in forty seconds; in sixty it howled very loudly; convulsed; eyes, mouth, and tongue, as usual; did not stir after two minutes and a-half; heart ceased to beat in five minutes; neither fæces nor urine passed.

No. 40.—Rather small mongrel bitch. Gave eight minims of acid in one drachm of water by the vagina, by means of a funnel;

not more than two-thirds passed in, and of this part immediately escaped. She ran about as though nothing had happened; in two minutes and a half fell struggling, and rose alternately; retched violently, and vomited thick frothy mucus; eyes prominent and red; pupils not excessively dilated; breathes with excessive rapidity, and cannot stand; five minutes and a half, plunged into water, then placed under a strong douche, so as to allow the water to fall down the back; not much effect upon the symptoms, but she appears to dislike it very much; seven minutes and a-half, tried to raise herself, but could not; douche used again; fæces passed, but no urine; twenty-three minutes, retched violently, but did not vomit; thirty minutes, peculiar spasmodic action in all the limbs, and head, and neck, which rapidly move in regular succession; thirty-nine minutes, got up, came and smelled at No. 43, and showed great disposition to lie down beside him; appeared cold; thick, frothy saliva running from the mouth; fifty-five minutes, pupils now excessively dilated. The symptoms were as similar as possible to those to whom the cyanuret of silver had been given; he did not lose consciousness nor sensation. (*Vide* No. 12.)

No. 41.—A young, not quite half grown, spotted coach dog. Put five minims upon the left eye, holding the lids open and apart, but not more than half of it passed in; conjunctiva became instantly red; thirty seconds, fell; one minute and a half, low continuous moaning, then howling; two minutes, all the limbs convulsed in rapid succession, as though galloping rapidly, the head being drawn backwards at the same time;* pupils somewhat dilated; the left most so; seven minutes, appeared to be recovering, when it was placed under the cold douche, which seemed to stupify it; eight minutes, purged freely; twelve minutes, got up and walked off. Eighteen minutes, put three minims into the eye; fifteen seconds, it breathed hard, fell, and howled loudly; two minutes, struggled hard to get up, but could not; died soon afterwards.

No. 42.—A spotted coach dog eat some bread and butter, upon which cyanuret of silver, made immediately before by dropping a solution of nitrate of silver into distilled water containing twenty minims of Scheele's acid, had been spread; in two minutes and

* The motion was very similar to, but not exactly identical with, that observed in No. 41.

a-half he passed fæces freely, which he also did afterwards; in three minutes and a-half he got hold of the paper in which the bread and butter had been wrapped, and, running about, chewed it; twelve minutes, is not so much disposed to run about; seems weak; breathes quickly, with the mouth open, which is red; in one hour he vomited a large mass of white frothy mucus mixed with food; quite disinclined to move; two hours, continues dull, but otherwise not affected.

No. 43.—Very strong and savage moderate-sized mongrel dog. Attempted to give by the rectum the cyanuret of silver made from twenty-five grains of the nitrate, but could not, as he struggled so hard that prolapsus of the gut came on, and the funnel became filled with fæces; then tried by the mouth, but before he took much he seized hold of the bottle out of which I was pouring it, (mixed with water,) bit this in two, and only had about a fourth part of it: he ran off, soon became affected in the breathing, and weak in the limbs; in eight minutes he was much distressed, and retched violently for at least two minutes, then vomited a large quantity of thick, frothy, bloody mucus, which relieved him; but he continued dull, heavy, and indisposed to stir, thick, frothy saliva draining from the mouth; thirty minutes, vomited again thick, frothy mucus, but not bloody; forty minutes, much the same; attempted to give twenty minims of acid by the mouth, but he again got his head loose and seized the minim measure, which he bit in two, and lost half of the acid; when let loose he ran away, but soon fell and passed urine; did not lose consciousness, nor all muscular power; five minutes, he suddenly raised his head and neck, but could not stand; now put ten minims of acid into his ear; this did not seem to produce any effect, and when put upon his legs ten minutes after he walked off; he was allowed to walk about for ten minutes, when I attempted to give him fifteen minims, but he again struggled so hard as not to swallow more than about seven minims; he now soon fell and was convulsed, but was not very rigid, nor were the pupils excessively dilated; he continued to breathe, alternately convulsed and flaccid for five minutes, when two minims were put into the eye; he *instantly* became more rigid, and was dead in two minutes afterwards.

No. 44.—Small mongrel bitch. Gave fifteen grains of cyanuret of silver, but she did not swallow the whole: tongue and mouth

became very red; three minutes and a half, begins to affect her; respiration hurried; urine expelled; retches; unsteady on legs; then sick; pupils very widely dilated; after sickness seemed to rally, but made constant attempts to pass urine; nine minutes, vomited violently, and brought up a large quantity of thick, white, tenacious mucus; up to this time had stood as though stupid and afraid of stirring, now lay down in a corner of the room; twenty-five minutes, has lain dull and motionless, with thick white saliva draining from the mouth; sat up on the hind legs, in a sitting position, in which it remained more than a minute without stirring, then fell and lay still. An hour afterwards, when one of the dogs howled, it was much frightened, started up, ran away, and was immediately sick.

No. 45.—A good-sized mongrel spaniel. Gave thirty grains of cyanuret of silver, but more than half lost: in three minutes the respiration was quick and the pupils dilated; four minutes, begins to be unsteady on the limbs; five minutes, retched violently, and after much straining brought up thick white frothy mucus; crept to No. 44, close to which it laid down, breathing very hurriedly, and continued to do so for an hour, most of which time it ran about the room, but the limbs were weak and unsteady; purged and often sick; was perfectly sensible, but appeared cold and desired to be petted; like the last it repeatedly strained to pass water after the bladder was emptied, and thick mucus-like saliva drained from the mouth. After waiting two hours I left them, No. 44 still crouched motionless in the corner, but quite able to move if forced to do so; No. 45 had crept under some sacks. For some hours these two dogs would not move unless forced; refused drink and food, the same thick saliva running from the mouth, but in the morning they had quite recovered and continued well during the day. The unsteady staggering and weakness in the limbs of these two dogs *closely resembled the reeling of a very drunken man*, the muscles having lost much of their force as well as power of combined action. The quantity of white thick mucus vomited by both dogs was large, and exactly alike. Twenty-four hours after, gave No. 44 eight minims of acid; she ran away, and fell; in forty seconds, struggled hard, became rigid, and remained so for one minute and a-half, during which she did not breathe, nor could the heart be felt; the limbs then became flaccid and motionless, the

respiration slow, and the heart's action tumultuous, then very quick and feeble, and the respiration hurried; these ceased in fifteen minutes, having gradually become slower; tongue, mouth, and eyes as usual, but eyes not quite so prominent nor red as often seen.

Twenty-four hours after, gave No. 45 six grains of nitrate of silver, in order to be certain of its effects; in ten minutes, it vomited, but not otherwise affected; thirty minutes after, gave five minims of Scheele's acid, but not all taken, as it struggled so hard; two minutes, began to breathe quick and stagger; vomited thick white tenacious mucus; ran staggering about the room, fell, and tried very hard to rise, but could not; eyes prominent and pupils dilated; six minutes, lies unconscious, breathing quickly and laboriously; ten minutes, becoming sensible; purged; twelve minutes, sat up with the limbs in a bent uncomfortable posture, but made no attempts to alter it; fifteen minutes, can just stand when placed upon legs, but cannot walk nor get upon legs; it is, however, recovering; twenty-five minutes, put two minims into right eye; in thirty seconds, affected; fell, struggled hard; attempted to howl but could not; during twenty minutes lay motionless and respired laboriously, but deeply, at first very slowly, afterwards rather better; head now repeatedly plunged in cold water; it instantly became convulsed and rigid, and the respiration quick; the effect soon ceased; twenty-five minutes, gave one drachm of liquor ammoniæ fortis (diluted) without effect; dead in thirty minutes after acid had been put into the eye. When this bitch began to move, after having the head plunged in water, the motions were peculiar, all four limbs were moved at the same time in quick succession, with a short rest between, and resembled the effect of electric shocks passed in quick succession. (See 40 and 41.) The struggling and unsteady walking were exactly like those dogs to whom the cyanuret of silver had been given, indeed, up to the falling the symptoms were the same.

No. 46.—Young bull-terrier bitch. Gave fifteen minims of acid, and instantly afterwards nine grains of nitrate of silver in three drachms of water: in thirty seconds she fell and became rigid; howled a little; the rigidity soon ceased, and she lay perfectly still, except at two minutes when the tail alone was violently convulsed; mouth and tongue as usual; the pupils dilated, but eyes not injected; at seven minutes the heart ceased to beat. During the

whole time she did not breathe more than four times, and after rigidity ceased only moved once.

No. 47.—A large water-spaniel dog. Gave twenty minims of acid and instantly (it being ready poured out and held in the hand ready,) nine grains of nitrate of silver in three drachms of water; in thirty seconds, respiration hurried; fell backwards and howled much in an acute shrieking voice; one minute, pupils not dilated; urine passed; four minutes, up to this time, since he fell, the respiration had been very slow, it now became hurried; eyes much injected, but pupils not much dilated; ten minutes, lies perfectly still, the heart beating irregularly; fifteen minutes, in the same state; applied ammonia to the nostrils, and put a little into the mouth; twenty-five minutes, respiration quick, very laborious, and panting; limbs rather stiff; gave half a drachm of liquor ammoniæ in water, which was swallowed, the limbs being moved once; thirty minutes, gave forty minims of liquor ammoniæ, which was swallowed, but no effect produced; was also well fanned without any effect; pupils dilated. As he had lain so long in the same state, and I had an engagement, I put five minims of Scheele's acid upon the left conjunctiva with decided effect; in fifteen seconds he was convulsed, and became excessively rigid for a minute, then relaxed; moaned; respiration much slower; conjunctiva very red and vascular; forty minutes, became rigid for a moment; heart's action and respiration ceasing together. When the solution of nitrate of silver was dropped into the mouth, this became covered with white flaky matter, evidently the cyanuret of silver, and not the chloride from the saliva.

No. 48.—Moderate-sized dog. Gave thirty minims of acid in two drachms of water: it fell in fifteen seconds, perfectly insensible; howled slightly; jaw firmly closed; in forty seconds gave ten grains of nitrate of silver in three drachms of water; it neither stirred nor respired after; no pulsation of heart after two minutes.

No. 49.—Moderate-sized spaniel dog. Gave ten minims of acid with ten minims of liquor potassæ, in one drachm of water: in twenty seconds it fell and howled; mouth perfectly scarlet; pupils excessively dilated; heart ceased to beat in four minutes; did not stir after one minute and a-half.

No. 50.—Fat mongrel (rather large) dog. Gave ten minims of the

strong acid, equal to fifty of Scheele's, with twenty of liquor potassæ in one drachm of water; he struggled very hard against it, and squeezed the funnel flat with his teeth; affected almost immediately; thirty seconds, very rigid and jaws fixed, but mouth forced open, and a mixture of oxide of iron* poured in by means of a funnel; but little seemed to pass the fauces, all power of deglutition being lost, even the passage of fluids not taking place; heart ceased to pulsate in one minute after the acid had been swallowed.

No. 51.—Spaniel dog, old, and same size as No. 52. Gave ten minims of acid; in fifteen seconds gave as much of a thick mixture of the carbonate of iron as I could get into him, (about six drachms of iron were swallowed;) in one minute from the giving of the acid he was put down, perfectly paralyzed, when the greater portion of the iron drained out from the mouth and nostrils, as though the œsophagus were also paralyzed; in three minutes a white foam passed from the mouth; at six minutes the heart ceased to beat. This dog did not breathe more than three times, and scarcely stirred after being put down.

No. 52.—Rough-haired Scotch terrier—a strong old dog. Gave ten minims of acid; in fifteen seconds gave a thick mixture of carbonate of iron, (the red oxide;) he dropped, and did not stir until two minutes, when he breathed, but laid otherwise motionless; pupils much dilated; eyes red; in five minutes and a-half heart ceased to beat.

No. 53.—Mongrel dog. Gave ten minims of acid; in fifteen seconds, an ounce of strong solution of sulphate of iron, during the giving of which he howled slightly, and dropped on the ground; he struggled hard; eyes very prominent and red, pupils dilated; mouth red; three minutes, muscles perfectly flaccid, but tremulous; in four minutes and a half heart ceased to beat; only breathed once after the first minute; neither urine nor fæces expelled.

No. 54.—Good-sized spaniel bitch. Gave twenty minims of acid, and in thirty seconds an ounce of strong solution of sulphate of iron: she dropped at once; howled and struggled a little; heart ceased to beat in four minutes; just before the heart

* This was made immediately before by adding potass to a solution of sulphate of iron.

ceased to beat the tail (alone) was much convulsed; otherwise, after first minute, gave very little indication of life.

No. 55.—Terrier dog. Gave two drachms of a saturated solution of chlorine: no effect in any way; he continued very active and cheerful.

No. 56.—Large, rough-haired, mongrel dog. Gave (July 23rd, six a.m.) ten minims of acid: he *ran down and up a flight of steep winding stairs, and down a second time,* when he fell at the bottom, and howled a great deal; fæces passed; was carried up stairs, and at three minutes one drachm of a saturated solution of chlorine given; lay breathing hard, with scarcely any motion; eyes and mouth as usual; twenty minutes, gave another drachm of solution of chlorine, for which he was, to all appearance, worse rather than better, lying perfectly helpless; respiration slow; thirty-eight minutes, gave one drachm of liquor ammoniæ fortis in one ounce of water, which induced increased respiration; this soon became very hurried, the chest being but little expanded, with mucous rattle; he lay apparently dying until one hour and a-half, when he was convulsed and became rigid, with mucous râle still louder; at four hours appeared to be dead, but on attentively watching, was seen to breathe at distant intervals very slightly; four hours and a-half, water dashed gently upon the face revived him; gave now fifteen minims of liquor ammoniæ in one drachm of water, when the jaw became rigid, and he immediately barked quite loudly six or seven times in succession; breathed hard for two more minutes, then lay just as before, as though in a profound quiet sleep, breathing slowly and gently; indeed, he lay so still that I thought he was dead. In same state in the evening. July 24th, six a.m., twenty-four hours after the acid had been given: late last night barked very loudly for some time; lies just where, and as he was left yesterday, but breathes better; is quite conscious, but has not the least power in the limbs; will not drink; pupils *quite contracted.* In the course of the morning he appeared to be very much starved, though the day and room were hot; put into a warmer place. At noon, thirty hours after the acid had been given, he made so much noise, barking and howling, still lying as before on his side and unable to stand, that he disturbed the whole building, and in my absence, to my great annoyance, four minims

of the strong acid—equal to one of anhydrous, and to twenty of Scheele's—were given to him; in thirty seconds he became affected in the usual manner, but lived for thirty-five minutes; though he struggled for some time he ceased to howl.

No. 57.—Strong, bull-terrier dog. Gave twenty minims of acid; in forty-five seconds gave three drachms of saturated solution of chlorine, diluted with water. Before he got the chlorine the dog howled; he dropped, and lay without stirring until one minute and a-half, when he became very rigid; two minutes, became flaccid; three minutes, passed a little urine, pupils becoming very widely dilated; four minutes and a-half, heart ceased to beat; he only respired three times after falling; the eyes were not very prominent nor red, and the pupils not widely dilated, until three minutes after the acid had been taken.

No. 58.—A large strong cattle-dog, (like a wolf dog,) weighing, at least, 40lbs. Gave fifteen minims of acid, and in thirty seconds, one ounce of solution of chlorine: he howled excessively and struggled hard; one minute and a quarter, ceased to struggle, and lay as though dead until two minutes and a-half, when he began to breathe; four minutes and a-half, convulsed and howled a little; eyes not much injected nor prominent; mouth not red; ten minutes, heart ceased to beat; the respirations were distant, but violent; the pulsations of the heart during the last three minutes were very feeble; no urine passed, but before the heart ceased to beat fæces were passed.

No. 59.—Large strong woolly old French dog. Gave eight minims of acid; thirty seconds, gave four grains of sulphate of copper in three drachms of water: he immediately fell, and retched violently, but vomited only a little; five minutes, heart beat laboriously; opened an artery in the hind leg, *blood arterial* in colour flows slowly; seven minutes, passed fæces; nine minutes, blood flowed more quickly, and heart beat more freely; fifteen minutes, the number of inspirations per minute, as nearly as can be counted, is 130; bleeding stopped, four ounces having flowed; breathing continued as rapid, but gradually became almost imperceptible, until thirty-five minutes, when the dog slightly moved for the first time, and the respiration became stronger; he appears never to have been altogether insensible, and is now perfectly

sensible; thirty-eight minutes, cannot rise, but is able to sit when put into the position; forty minutes, could stand, and at forty-five, with assistance, able to walk; retched, but did not vomit; sixty minutes, nearly recovered: hanged.

No. 60.—Old, very strong, savage, but not very large, brindled bull dog. Gave eight minims of acid, and instantly afterwards three grains of sulphate of copper in six drachms of water: he walked about, not much affected, until forty-five seconds, when he began to stagger very much, falling and getting up again, exactly like the dogs to whom cyanuret of silver had been given; did not rise after one minute and a-half; five minutes, able to stand still, with the legs widely stretched out; fæces passed; ten minutes, vomited thick, frothy matter, mixed with food; he continued for half an hour to vomit and retch most violently, when he could stand better and walk; forty-five minutes, gave eight minims of acid; fifteen seconds after, fell and howled a little; lay until twenty minutes as though about to die, breathing very slowly, when he altered, became more sensible, and the respiration very hurried; thirty-five minutes after the second dose, and eighty after the first, quite sensible to all that is passing, and looks very much as though he would like to bite any body or thing he could, but he lies with all the limbs perfectly paralyzed; well shaken, became instantly rigid for a minute, and passed water; forty-four minutes, cold water dashed over him, when he was immediately roused, got up, shook himself, and was able to stand; forty-seven minutes, water dashed on him for the fourth time; this he tried to avoid, and staggered much; sixty minutes, so far recovered as to be only weak and stupid, and very much indisposed to move; hind legs the weakest. Now put ten minims of acid upon the tongue, when he *instantly* passed a large quantity of water and fell; he lay perfectly still, breathed several times for five minutes, when he died.

No. 61.—A small spaniel (young). Five minims of acid, placed upon the tongue, took effect in seven seconds; the respiration becoming very hurried, three grains of sulphate of copper in one ounce of water given; in twenty seconds it fell backwards and howled slightly; forty seconds, urine passed; one minute and a quarter, retched a little, but did not vomit; lay perfectly paralyzed, until five minutes, breathing slowly, when it died. In this case the eyes were not very red nor prominent; the pupils were not

much dilated, and did not altogether lose their sensibility to light; the mouth, as usual, red, with jaws open, and the tongue hanging out flaccid.

No. 62.—Rough cur bitch, rather small and aged. Gave seven minims of acid: she dropped, struggled, and attempted to howl, but could not; passed both fæces and urine, in thirty seconds gave three grains of sulphate of copper dissolved in one ounce of water; in two minutes she retched violently, but did not vomit; at five minutes gave another similar dose of the sulphate; eyes prominent, pupils dilated, as usual; fifteen minutes, lay perfectly still, with much thick froth about the mouth; but when another dog's leg was brought into contact with her mouth, she tried to bite it; twenty minutes, became rigid for a second or two; only breathed once after this; heart ceased to beat at twenty-four minutes; a large quantity of thick froth passed from mouth and nostrils; the respiration was very feeble for some time before death.

No. 63.—Large strong springer dog. Gave ten minims of acid in two ounces of water, but he struggled so hard that not quite the whole was swallowed; howled slightly, and dropped as though dead; one minute, gave six grains of sulphate of copper dissolved in two ounces of water; lay as though dead until three minutes, when he began to breathe, and respiration became very quick and panting, 110 in the minute; thirty minutes, though apparently breathing violently, the least pressure upon the ribs suspends respiration; thirty-five minutes, poured down the throat four drachms of water, without any effect; fifty minutes, a large quantity of bloody water drained from the mouth; gradually becomes weaker and weaker; fifty-three minutes, slightly convulsed; sixty minutes, dead. During the whole time he scarcely moved the limbs; they lay stretched out powerless, but without the least rigidity. I could not satisfy myself as to whether he retained any sensibility or not; and indeed it is, in nearly every case, very difficult to do so, the eyes appear so very bright and expressive, while the limbs, when not rigid, are so completely paralyzed that they are unable to be moved when pricked, even though pain be induced; the pupils were not affected by variations in the degree of light, but when the ciliæ were touched there was winking; he appeared to feel very sick, without having any power to vomit.

No. 64.—Small full-grown mongrel bitch. Gave six minims of acid in one drachm of water; from her struggling, not more than four minims were swallowed; in thirty seconds gave two grains of sulphate of copper in half an ounce of water; one minute, she fell powerless; one minute and three quarters, retched and vomited a very small quantity of fluid; lay perfectly still, breathing deeply, but slowly, till seven minutes, when four grains of sulphate of copper in one ounce of water were given; it was swallowed with great difficulty, and produced no perceptible effect; continued sensible up to twenty minutes, when she became insensible; thirty minutes, respiration very slow and feeble; heart can only be felt pulsating at the instant of complete expiration ;* thirty-two minutes, white foam passing from the nostrils; thirty-three minutes, dead.

No. 65.—Mongrel bitch. Gave six minims of acid in one drachm of water; fifteen seconds after, four grains of tartarized antimony in ten drachms of water: she struggled and fell in one minute and a-half, then lay perfectly still, and appeared insensible for six minutes, when she got up and tried to stand; twelve minutes, purged and able to walk about; thirty minutes, quite recovered. Gave six minims of acid in one drachm of water; thirty seconds, fell, having stood perfectly still; unable to move, having lost all command over limbs; howled loudly; very rigid for a short time, then became perfectly paralyzed; breathed heavily up to nine minutes, when she was dead.

No. 66.—Moderate-sized mongrel terrier dog. Gave six minims of acid, and in fifteen seconds three grains of tartarized antimony in one ounce of water: forty-five seconds, fell suddenly backwards, and lay perfectly still and motionless, except slowly respiring, to eight minutes, when he was strongly convulsed, then lay still again; fifteen minutes, heart beating rapidly and feebly, respiration slow and laborious, these became weaker and slower, as though he were just about to die, up to thirty-five minutes, when he rallied and tried to sit up, but could not; fifty minutes, placed under the douche, without effect; gave a good shaking, which induced him

* This is to be explained, I apprehend, merely from the fact of the thoracic parietes, at the moment of complete expiration, being in closer proximity with the heart than at other stages of the respiratory act, permitting the feeblest motions to be perceived.

to howl a little; sixty minutes, seems nearly recovered, except weakness. Gave five minims of acid; thirty seconds, struggled hard, then lay still up to twelve minutes, when he was convulsed, passed water, and ceased to live.

No. 67.—Young moderate-sized mongrel. Directly after No. 60 had vomited, he ate the whole of the ejected matter without any effect being produced upon him; thirty minutes afterwards I gave him six minims of acid, but not more than four were swallowed; forty-five seconds, he fell and struggled hard to rise, but could not; one minute and a-half, gave three grains of tartarized antimony in one ounce of water; dropped motionless when put down, and lay so for two minutes, when he gradually recovered; was able to sit when put up, and stagger a few steps; six minutes, purged and vomited freely; fifteen minutes, able to stand when set up, but not to rise; seventeen minutes, can walk, and seems nearly recovered. Twenty minutes, put five minims of acid into the eye; in thirty seconds fell, struggled hard, and howled very loudly; ten minutes, dead. After he fell and struggled he scarcely stirred or breathed, but the heart continued feebly to pulsate.

No. 68.—Mongrel terrier, same size as last. Gave six minims of acid; twenty seconds, it began to breathe hard; thirty seconds, fell and howled a little; in one minute, gave forty-five grains of sulphate of zinc in six drachms of water; it lay perfectly powerless, with a discharge of thick white foam from the nostrils; six minutes and a half, heart ceased to beat; neither urine nor fæces passed.

No. 69.—Mongrel spaniel, same size as last. Gave six minims of acid, and *instantly* afterwards forty-five grains of sulphate of zinc; it ran about backwards and forwards as though distressed; fell and howled very loudly; one minute, struggled, and then laid perfectly still and flaccid; pupils much dilated; two minutes and a half, began to breathe convulsively; five minutes, fæces and urine passed; seven minutes, one ounce of solution of zinc, (one drachm); unable to swallow much, part returned through nostrils; continued motionless; nine minutes, heart ceased to beat. I never saw the pupils so much dilated, the irides were scarcely to be seen.

No. 70.—Rough-haired terrier dog, not fully grown. Gave six minims of acid: he ran about as playful as though nothing had

happened; thirty seconds, staggered, fell, and howled much; forty-five seconds, gave half a drachm of sulphate of zinc, dissolved in four drachms of water; lay without stirring until four minutes, when there was one convulsion; seven minutes, the heart ceased to beat. Only stirred once after the sulphate of zinc had been given.

No. 71.—Full-grown mongrel bitch, larger than last, in pup, but not far gone. Gave six minims of acid, and *instantly* after half a drachm of sulphate of zinc in four drachms of water; ran about; in one minute, fell and howled slightly; three minutes, lies perfectly still, but is, I think, sensible; respiration very quick; four minutes, pupils not much dilated; urine and fæces passed; seven minutes and a half, perfectly conscious, can just wag the tail; is unable to rise, indeed, seems perfectly powerless; twelve minutes, got up and passed fæces again; fourteen minutes, purged again; sixteen minutes, ran about, with constant efforts to pass fæces; pupils now fully dilated; twenty-five minutes, vomited a mass of thick white frothy mucus; forty-five minutes, has vomited two or three times. There continued great weakness of the limbs, with an indisposition to move, but at the expiration of an hour this had disappeared, and he seemed as well as ever and lapped water freely.

No. 72.—Very large terrier dog. Gave two drachms of strong liquor ammoniæ in two ounces of water; no effect produced.

No. 73.—A brindled cur dog, of good size, strong and active. Gave ten minims of acid, and in fifteen seconds one drachm of liquor ammoniæ in one ounce of water; he immediately fell down, howled a little, and was convulsed; in three minutes, breathed convulsively; four minutes, became motionless; in six minutes the heart ceased to beat; pupils not much dilated; urine and fæces passed; mouth perfectly scarlet.

No. 74.—Large rough terrier. Gave ten minims of acid, by mouth; in forty seconds, gave one drachm of liquor ammoniæ fortis in two ounces of water; he struggled while held to give this, but when let go dropped down; placed under the douche twice, but without effect. He did not stir nor breathe after he dropped, nor could the heart be felt to pulsate.

No. 75.—Small mongrel dog. Put three minims of acid in the

right eye, the pupil of which almost instantly became dilated. He soon began to stagger, and ran about, getting into the corners of the room; in forty-five seconds he fell, and lay breathing hard; in three minutes, forty minims of strong liquor ammoniæ in two ounces of water were given with but little effect; at twelve minutes a similar dose of ammonia was given, when he instantly retched violently, soon rallied, and became able to stand, though he breathed hard and thick; at thirty minutes, put five minims of acid into the eye; in fifteen seconds after this he fell down; in thirty seconds, howled very loudly, passed urine, became convulsed, and in eight minutes the heart ceased to beat.

No. 76.—Moderate-sized spaniel bitch. Gave twelve minims of acid in two drachms of water; twenty-five seconds, she fell; one minute, strong liquor ammoniæ applied freely to the chest and abdomen, with good friction; four minutes, pupils *not* dilated; eyes injected; mouth red, with a large quantity of mucus about it; twenty-two minutes, dead; respiration and the action of the heart ceased at the *same* time, the breathing having been very slow and slight, and the pulsations of the heart very feeble for some minutes. Before death the pupils became much dilated; neither fæces nor urine passed; no howling, and but little struggling.

No. 77.—Rather large French poodle dog, recently shorn. Gave twenty minims of acid: he ran actively away; twenty seconds, fell, struggled hard, and howled a little; one minute, well rubbed with strong liquor ammoniæ; five minutes, eyes injected, but the pupils not much dilated; heart ceased to beat in eight minutes. At five minutes he had a strong convulsion, with rigidity, after which he only moved once. This dog was much convulsed; neither urine nor fæces passed.

No. 78.—Rough poodle bitch (young). Gave six minims of acid; in twenty seconds she fell, and howled a little; no struggling; instantly rubbed well with strong liquor ammoniæ; pupils excessively dilated almost immediately the acid had been given; mouth not red; dead in four minutes, having scarcely struggled or been at all rigid; a little urine was passed.

No. 79.—Large bitch, same size as No. 56. Gave ten minims of the acid diluted with an ounce and a half of water; she did not get quite the whole; in twenty seconds fell, struggling; lay until

one minute and a-half, when she got up and stood until three minutes, then fell again; four minutes, worse, struggled hard, and vomited; six minutes, bled in the hind leg to three ounces; howled; thirty minutes, quite conscious, but unable to stir; fifty-five minutes, gave one drachm of liquor ammoniæ in one ounce of water; struggled hard against it; no other effect; when put down limbs appeared completely paralyzed; sixty-five minutes, water dashed in face without effect, unable to move a limb; seventy-five minutes, when noticed seemed pleased, and wagged the tail; limbs stronger, but unable to support herself; eighty minutes, got up and walked about; ninety minutes, yelped much. Three p.m., nine hours after acid had been given, appears perfectly recovered. Gave thirty minims of acid; ran about the room, followed me, when called, went down three or four of the stairs, saw the door at the bottom shut, came up again, now staggered, and fell in forty seconds; howled but little; rigid for one minute and a-half; heart ceased to beat at six minutes, having only breathed twice after the second minute; urine, but no fæces, passed when she fell.

No. 80.—Large strong savage old bull terrier dog. Gave fifteen minims of acid: in twenty seconds it began to affect him; in thirty seconds he fell and lay still; one minute and a half, opened a vein in the neck, lost eight ounces of blood; three minutes and a-half, passed a large quantity of urine; eyes very prominent; heart ceased to beat in nine minutes, there having been no other indication of life after the sixth minute. The bleeding did not produce any effect that I could perceive; indeed, in proportion to the size of the dog and the quantity of acid, he died sooner than many others. The blood, as it flowed, was not so dark as human venous blood, and in an hour afterwards it was of a bright fluid hue.

No. 81.—Moderate-sized strong cur, having a cross of the bull dog. Gave ten minims of the acid: at first he ran briskly about the room, became unsteady, and fell at thirty seconds, but struggled hard, and made many efforts to get up; the limbs became extended and perfectly rigid until two minutes and a half, when they became flaccid, and he lay for a minute without breathing, and as though dead; the heart could not be felt to beat; then a violent convulsion; at six minutes, opened the jugular vein, the one in the

leg not having bled freely; lay still and only breathed once after nine minutes. The saphena vein was opened in one minute and a half after the acid had been given; at first blood flowed, but soon ceased, and not more than half an ounce passed; from the jugular the blood passed freely, and three ounces escaped. The blood was brighter, and more of a brick colour than venous blood in health. The heart and respiration were less distressed than in most cases; sensibility was never entirely lost until death took place. This dog, like many others, did not howl.

No. 82.—Half-grown cat. Gave three minims of acid; it jumped off the table and ran into a corner of the room; twenty seconds, affected; twenty-five seconds, fell convulsed, but not violently; fæces passed at forty-five seconds; dead in one minute and three quarters.

Body examined three days after Death.—Decomposition sufficiently advanced to produce a smell, but not to destroy rigidity; brain and spinal marrow natural; vertebral sinuses (veines meningo-rachidiennes,) much distended, as were the veins generally, particularly the superficial; left ventricle perfectly empty; right contained one drop of blood; left auricle two or three, and the right auricle more, but not distended; all the large vessels near the heart almost empty; blood partly coagulated.

No. 83.—Half-grown cat. Gave three minims of acid, and *instantly* ten grains of nitrate of silver in one drachm of water; nearly, but not quite the whole was swallowed; affected in the ordinary manner, but not so much convulsed as some; made some little noise, but did not howl; urine, but not fæces, passed; dead in two minutes and a quarter.

Body examined three days after.—Vertebral sinuses not much distended, nor were the veins generally; left auricle and ventricle, and right ventricle, perfectly contracted and empty; the right auricle contained a little dark fluid blood; the venæ cavæ and pulmonary veins contained very little blood; the aorta and pulmonary arteries not any.

No. 84.—Small rabbit. Gave two minims of acid; it attempted to run, but could not; fell in twenty-five seconds; convulsed, cried, but not loudly; still in less than two minutes.

Opened immediately.—Heart actively contracting; all the cavities contained blood, but none of them particularly full; venæ cavæ much distended, blood dark; on the aorta being opened, blood flowed; heart continued for some time to contract, gradually becoming empty and small. Thirty-six hours after, the vertebral sinuses were found extremely distended throughout the canal; the marrow itself and brain, with their membranes, were not engorged.

No. 85.—Same-sized rabbit as the last. Put two minims of acid upon the left eye, the lids being held apart for fifteen seconds to secure its full application: in twenty-five seconds it fell upon the side, was convulsed, and cried louder than the last; dead in rather less than two minutes; eyes not prominent nor injected; the pupils dilated, but the left most so.

Opened at the third minute.—Heart and large vessels in the same condition as the preceding, as were the head and spine thirty-six hours after.

No. 86.—A rabbit one month old, and a kitten fourteen days old, were put together into an oval preparation glass jar, of sufficient size to hold eleven pints, and to allow them to move about. Into this jar four minims of acid were dropped, and it was covered over. The kitten showed decided symptoms of being affected in twenty-five seconds: it struggled as though attempting to run, but unable to get a holding for its feet, it soon fell upon the side, and cried out feebly three or four times; at four minutes it had rather a strong convulsion, then lay still, breathing with great convulsive movement at intervals of a minute, the respiration becoming shorter and feebler until twenty-eight minutes, after which it did not stir. Examined one minute after it ceased to breathe.

The rabbit was not decidedly affected until forty seconds, when it moved in a similar manner to the kitten, soon fell upon its side, breathed convulsively, making a low whining noise with each inspiration. It was dead in two minutes and a half, not having had any violent general convulsion; the pupils were natural, rather contracted than dilated; the eyes were not prominent nor injected; the mouth was as pallid as after death from any other cause. Examined five minutes after it ceased to breathe.

No. 87.—It having been suggested to me by a scientific friend that probably sulphuric æther might be usefully employed against the effects of hydrocyanic acid, I first ascertained that the vapour

of it was not prejudicial to the animals by placing one for a quarter of an hour in the jar with twenty minims of æther, without any ill effect. I put a rabbit and kitten of the exact size (from the same litters,) as No. 86, into the same jar, with a similar quantity of acid (four minims,) and twenty minims of sulphuric æther. In ten seconds, the kitten cried out, in fifteen seconds, struggled hard, and in twenty seconds, fell upon its side; its mouth became intensely red, and the jaw closed with some foam about the lips; after breathing a few times it lay as though dead until three minutes and a half, when it was strongly convulsed, very rigid, and cried loudly in a natural voice; it then breathed at intervals of about one minute until twenty-four minutes, after which it did not stir; before death, as rigidity went off, the redness of mouth disappeared. The rabbit was affected in twenty-five seconds, fell with hardly any struggling or noise, and did not breathe after one minute and forty-five seconds; mouth not red; eyes natural, pupils rather contracted than otherwise.

No. 87.*—A half-grown cat, was put into the jar with two minims of acid and twenty minims of sulphuric æther: in forty-five seconds she became strongly convulsed for twenty seconds, then paralyzed; at five minutes she was slightly convulsed, otherwise lay without any motion; the respirations gradually became feebler up to ten minutes, after which she did not breathe; both urine and fæces passed. In this case all the cavities of the heart contained blood; the right side and the two cavæ were more distended than I ever saw them.

No. 87.**—A kitten, five weeks old, was put into the jar with two minims of acid and twenty of æther: it cried and made many voluntary efforts to escape for two minutes, when it gradually became weak and paralyzed. It was kept in the jar for fifteen minutes, during which time it continued slowly to respire, which was the only motion observed. There was not during the whole period the least appearance of convulsion. When first removed it breathed more freely, but only continued to do so for a minute. All the cavities of the heart contained blood, but not to the same extent as the last.

Nos. 88 and 89.—Strong half-grown cat, put into the eleven-pint jar with three minims of acid at one end of it and ten minims of liquor ammoniæ fortior at the other: she immediately sneezed

and coughed from the ammonia, and mewed in a natural manner; thirty seconds, decidedly affected; forty-five seconds, howled loudly, much convulsed, and mouth intensely red; two minutes, has continued rigid, pupils rather contracted; two minutes and a-half, pupils rapidly dilated; eight minutes, has for the last five minutes laid still, breathing about once in twenty-five seconds, at which time there is a little motion in the muscles; fæces passed; pupils not quite so much dilated; removed so that the vitiation of the air by respiration shall not have any influence; neither sensation nor reflex motion; fifteen minutes, has lain perfectly paralyzed, breathing about once in thirty-five seconds; thirty-five minutes, since fifteen minutes has been gradually improving, the respiration has gradually become deeper, more powerful, and much more rapid, being now thirty-five per minute, while the heart beats one hundred and twenty per minute; sensation appears to be returning; with each inspiration makes a low howl; one hour, has continued to improve, is now perfectly sensible; muscles have acquired some power, she can just crawl a step or two, but cannot stand; the fæces and urine have been freely passed; she has howled loudly with each inspiration, not as though in pain, but as vexed and distressed. On laying the hand upon the muscles there is felt to be a constant and rapid quivering of them; all that has been done to her is two or three good shakings, which materially roused her; put into a box with a warm soft bed and left for the night. In the morning, ten hours after, found under a table in a corner, perfectly able to run about, but was unsteady upon the legs, and she moved with some difficulty, cried, and appeared uneasy, liking to be petted and kept warm. Twenty-four hours after, having recovered so as to run about with other kittens, but not so actively, (it was cross, and disposed to fight them,) it was put into the same jar, with three minims of the acid, without the ammonia. It was not materially affected until forty-five seconds, when it fell and was strongly convulsed for at least a minute; the pupils became much dilated, and the mouth intensely red; it mewed, but did not howl; two minutes, paralyzed, after which it did not stir.

Body examined three days after death.—Perfectly rigid, scarcely any sign of putrefaction (weather warm, and it was exposed to the air in a room.) The vertebral sinuses distended, but not so much so

as in many cases; veins generally distended; left ventricle empty and contracted; left auricle contained two or three drops of blood; right ventricle held some little blood; right auricle and venæ cavæ distended, with partly coagulated dark blood.

The two last experiments appearing to support the idea that, under some circumstances, ammonia might possess some beneficial power, to test this the following were made, as it might be supposed that the cat in the second experiment was likely to be more easily affected, not having entirely recovered from the effects of the ammonia and acid, twenty-four hours before.

No. 89.*—To a kitten, three weeks old, gave one minim of acid: in twelve seconds it was affected, and soon became violently convulsed for nearly one minute; it howled loudly, then lay paralyzed; in eight minutes it ceased to breathe.

No. 89.**—To a kitten, from the same litter, gave one minim of acid, and instantly put it into a covered jar containing ten drops of strong liquor ammoniæ; in twelve seconds it was affected, and became violently convulsed for thirty seconds, then howled and was paralyzed; it ceased to breathe in seventeen minutes.

No. 90.—A young kitten, about fourteen days old, was put into the same jar, with three minims of acid: it mewed and crawled about unaffected for a minute, when it staggered and fell; it continued convulsed for a second minute, then lay paralyzed, breathing at distant intervals up to eight minutes, when it was removed from the jar; it immediately breathed better, mewed, and at ten minutes was convulsed, crying out loudly at the time, but appeared insensible; two hours after, has gradually improved, and now breathes well; it has frequently been convulsed and cried out; it is just sensible to pinching, but can neither stand nor crawl, nor, indeed, voluntarily stir a limb. Next morning, eleven hours after, can just stand, if it attempts to crawl it falls from side to side; heart beats very rapidly; twenty-four hours, improved, but still very feeble; fifty-six hours, can crawl a little; heart's action not so rapid. Three days after, being perfectly recovered it was put into the same jar with the same quantity of acid, but it was not *nearly* so much affected as before, and ten minutes after being taken out was almost well.

No. 91.—Kitten of exactly the same age as the last, put into the same jar with three minims of acid and six of strong liquor

ammoniæ: it was affected in twenty seconds, but not violently before a minute, when it cried out and was convulsed for nearly another minute, then it lay paralyzed until six minutes, at which time the fore part of the animal alone was convulsed; at eight minutes, it was removed; consciousness was not lost quite so soon as in the last; its eyes and nose were much affected by the ammonia. Two hours after, has lain as though in a most profound sleep, (exactly like the dog No. 56;) if well shaken it cries out in a distressed manner, and is able, in the very least degree, to stir its legs; like the last, put into a warm place for the night; eleven hours after, heart beats very rapidly, cannot walk, lies asleep, and cries if disturbed; twenty-four hours, not quite so strong as the last kitten. For the first time since the experiments, they (Nos. 90 and 91,) have taken a little milk, by having it poured down the throat. Thirty-six hours, can crawl, but is still weak. Three days after, being perfectly recovered it was put into the same jar with the same quantity of acid and ammonia; it was much affected by the ammonia and somewhat paralyzed, but did not become insensible; in fifteen minutes, being able to move, about four minims of acid were given by the mouth; it was affected in the usual way, being stimulated at first, but lived much longer than most of the others had done.

No. 92.—Rather larger kitten than No. 88, (I learnt afterwards it had not been well;) put into the same jar, into which three minims of acid had first been dropped: thirty-five seconds, affected, mewed hurriedly, was convulsed and rigid to one minute and a half, when it became flaccid, with the pupils intensely dilated; breathed slowly for four minutes, after which it did not stir; taken out at eight minutes, but gave no indication of life, and in less than two hours was very rigid.

Post-mortem examination twenty-four hours after death.—Lungs perfectly scarlet, they collapsed but little, owing to the air-cells being distended with thin frothy mucus and air; the crepitation and distension were so great that at first sight it appeared as though the cells were ruptured, however, on examining a thin slice with a lens this was seen not to be the case; mucous membrane of trachea not red. Left ventricle contracted and empty; the right contained some dark fluid blood, but was not distended; right auricle and venæ cavæ full; left contracted upon some little blood.

The blood under the microscope appeared to consist of a homogenous mass of very small reddish gelatinous granules.

No. 93.—Strong three-quarters grown cat. Put into the jar with three minims of acid: after being in it for thirty seconds she turned round and smelt strongly at the acid, as though to ascertain what it was; one minute, strongly convulsed; fæces and urine passed; eight minutes, taken out; she, however, had not breathed nor stirred after the third minute.

Post-mortem examination forty minutes after.—No motion of the heart; left ventricle perfectly contracted and empty; the three other cavities full, but not distended; venæ cavæ and pulmonary vessels full; aorta empty; lungs of a pale pink red, with a little frothy mucus, but not nearly so much as the last.

No. 94.—Same-sized cat as No. 93, but very inactive and sleepy; put into the jar, three minims of acid having been put at one end and six minims of strong liquor ammoniæ at the other: in fifteen seconds she was slightly affected, but at two minutes was able voluntarily to turn round; at four minutes, very strongly convulsed and pupils intensely dilated; eight minutes, taken out, having for the last three minutes been lying as though fast asleep and motionless, except breathing quickly and laboriously; neither fæces nor urine passed. Thirty minutes, has mewed loudly, in a distressed manner, and been convulsed, but is now able to sit up; forty minutes, walked about the room, purring and desiring to be noticed. Next morning, twelve hours after, perfectly well and able to eat a hearty breakfast of milk. Night, has been well, indeed, much more active than before the experiment, having played and jumped from chairs and tables without any sign of weakness.

No. 95.—Same cat as last, (twenty-four hours after,) put into the jar with three minims of acid: after one minute six minims of liquor ammoniæ were put into the jar; it had up to this time not showed any symptoms of being affected, but it immediately perceived the ammonia and tried hard to get away from it; one minute and a quarter, (from the first,) affected; one minute and half, fell, and continued convulsed to two minutes; breathed very rapidly to two minutes and a quarter, after which it did not stir.

Post-mortem examination forty-eight hours after.—Lungs crimson, but did not contain much mucus, and the trachea was nearly

free, its membrane being but little injected; left ventricle concontained a drop of blood, and was not quite so closely contracted as usual; the three other cavities filled, as were the cavæ and the pulmonary vessels; the aorta also contained blood; this was dark in colour and scarcely at all coagulated.

No. 96.—Same kitten as No. 90. Four days after, being perfectly well, put into the jar with six minims of liquor ammoniæ: it was allowed to remain for six minutes, being not otherwise affected than the eyes watering, mucus discharging from the nose, and much sneezing; now, three minims of acid were given by the mouth; in thirty-five seconds it was affected in the usual way, and at eight minutes dead, having for the last four breathed only four or five times, and been otherwise quite motionless.

Immediately opened.—Lungs, pale bright crimson. Left ventricle contracted; the auricle somewhat distended; the right ventricle and auricle full, as were the venæ cavæ and pulmonary vessels; aorta nearly empty. Heart beating; put three drops of acid upon it; the right ventricle appeared to lessen somewhat, and the pulsations to diminish in force and number, but after two or three minutes these became again more active.

No. 97.—Full-grown, very active, strong cat. Gave four minims by the mouth: it jumped off the table, but in twenty seconds fell strongly convulsed; twenty-five seconds, placed in the jar in which twelve minims of liquor ammoniæ had been put; convulsed for fifteen seconds after being put in the jar, when it became perfectly paralyzed, and did not stir nor breathe afterwards.

Chest opened eight minutes after the acid had been given.—Ammonia had evidently been respired from the appearance of the lungs, which were of a pale scarlet colour, and contained frothy mucus, the lining membrane of the trachea being also injected and covered with mucus. But little motion of the right side of the heart; left ventricle contracted and empty; the other three cavities distended, as were the pulmonary vessels; the two cavæ were very full; aorta empty; blood fluid, but subsequently it formed a soft coagulum.

No. 98.—Kitten, about six weeks old. Two minims of acid put into the left eye, the lids being held apart for the space of one minute: in twenty-five seconds it was affected, became much convulsed, cried loudly, and passed urine; at one minute it was

placed in the jar, into which six minims of the liquor ammoniæ had been dropped; it continued convulsed for twenty seconds, after which it gave no indication of life, except breathing once at two minutes and a-half.

Chest opened ten minutes after the acid had been given.—Lungs of a pale bright pink colour, collapsed, but the cells contained some frothy mucus. Heart: left ventricle, as usual, quite contracted and empty; left auricle filled, but not distended with blood; both right cavities, the venæ cavæ, the coronary veins, and the pulmonary vessels, quite filled, but not so completely distended as I have some times seen them; the blood in all was of a *very* bright florid hue; aorta perfectly empty.

No. 99.—Rabbit, rather larger than No. 100; put into the glass jar: ten minims of liquor ammoniæ fortior were put at one end of it and three minims of hydrocyanic acid at the other: it showed little sign of being affected for one minute, when it became restless and tried to get out of the jar, but still perfectly conscious, and with control over motion of limbs; one minute and three quarters, became feeble; two minutes, fell and struggled; two minutes and a-half, cried out; three minutes and a-half, ceased to move and to breathe; eyes natural—pupils rather dilated.

Body examined four days after.—Smelt, but not putrid; rigidity partly disappeared; vertebral sinuses all distended; cerebral not.

No. 100.—Rabbit, about a third-grown. Attempted to give two minims of acid mixed with four minims of liquor ammoniæ fortior in a drachm of water; certainly not more than half, but, I believe, not more than a third, was swallowed: it scarcely struggled, and did not make the least noise; it was dead in one minute; in less than five minutes rigidity commenced.

Post-mortem examination four days after.—Smelling, but not very putrid; vertebral sinuses distended. Left ventricle entirely empty; right partly filled; both auricles filled, as were the larger veins; blood coagulated.

No. 101.—Two minims of acid put into a test tube. A young mouse was held with the nose put into the tube: in four seconds it was powerless; it only moved its limbs and breathed once after being removed.

Opened in two minutes after.—The ventricles did not stir, but both auricles contracted rapidly; the left ventricle was quite contracted and empty; the right contained some blood, but was by no means distended; the left auricle nearly, but not quite, empty; the right contained some blood, but was not at all distended; the venæ cavæ not engorged; the lungs shrunk, and as white as a calf's in a butcher's shop; the auricles continued to contract for six minutes, at the end of which time both appeared perfectly flaccid and empty, as did the venæ cavæ.

No. 102.—Very large old mouse; nose put into the mouth of a phial containing about one drachm of Scheele's acid; in five seconds removed; it struggled, was convulsed, and cried faintly; dead in forty seconds.

Opened immediately.—Lungs as above; heart perfectly empty; left ventricle very large, as though hypertrophied, perhaps, as Cruveilhier and others suppose, from its sudden cessation of action, though I believe the heart of the mouse is, in proportion to the size of the creature, larger than that of many animals.

No. 103.—The nose of a third mouse was held for only one second in a phial containing four or five drachms of acid: for a minute it appeared scarcely affected, but then became still and weak; its respiration was laborious, and its limbs were convulsed; it lived for five minutes.

Chest opened four hours after.—Lungs perfectly crimson; left ventricle contracted and empty; right nearly so; both auricles contained some blood, as did the venæ cavæ and the pulmonary vessels; blood dark and fluid.

No. 104.—Small snake, (*Coluber Natrix.*) Gave two *small* drops of acid by the mouth; I had intended to give only one, but in its struggles two fell from the bottle, (the drops of hydrocyanic acid falling from the lip of a bottle are often smaller than those of many fluids): for five minutes no effect whatever appeared to be produced; it then became dull and disinclined to move, but if the tail were pinched it crawled quickly enough during fifteen minutes; it then became still until thirty minutes, when it roused up and appeared as though it would recover, but it shortly became perfectly still and lay as though dead, except that at distant intervals it breathed up to sixty minutes. It did not lose per-

ception nor sensation until it became perfectly still and paralyzed, at thirty-five minutes.

No. 105.—Small green lizard, (*Lacerta viridis.*) Gave one drop of acid: in forty seconds, affected; it gasped, appeared weak and turned round, then lay nearly motionless and paralyzed; four minutes, convulsed, particularly the tail up to its junction with the body; four minutes and a-half, dead.

No. 106.—Large toad. Gave eight minims of acid: it jumped away, and continued to do so vigorously for six minutes, when it appeared weak and dull; it now crawled, but did not jump; fifteen minutes, the legs remain in any position they are placed in; at forty minutes it revived, and moved about a little, but soon became still again; one hour, no sensation in legs, but when nostril is irritated the eye of the same side is depressed, and it tries with the foot to push away the irritant; eighty-five minutes, dead.

Opened five hours after death.—Ventricle and auricles moderately full, but not distended; they immediately began to pulsate regularly twenty times per minute, but the cavities were not emptied; fourteen hours, the heart is now enormously distended, the ventricle does not contract, but, on being touched, the auricles do; a short time afterwards the ventricle could be made to contract, and the auricles continued to do so for thirty hours, at which time the ventricle was empty and contracted and the auricles much less distended; blood fluid.

No. 107.—Large frog. Gave eight minims of acid: it leaped about, as usual, for five minutes, then lay still and dull up to fifteen minutes, when it suddenly jumped off a chair; breathing much affected, swallowing large mouthfuls of air; up to forty-five minutes could jump a distance of two inches, soon after which all sensation appeared lost, though reflex action still continued good; sixty minutes, dead.

Opened five hours after death.—No motion could at first be excited in the ventricle, but, by pricking, the auricles could be made to contract feebly; *they did so separately;* the ventricle then contracted; after an hour the pulsations were stronger and regular, at sixteen per minute; fourteen hours, all motion has ceased; the auricles full, the ventricle empty.

No. 108.—Large toad. Gave five minims of acid: no effect

for five minutes, when it became dull and the limbs convulsed; at seven minutes the breath smelt of the acid; twenty minutes, very dull and weak, but if put on the back has sufficient strength to right itself; sixty minutes, for the last fifteen minutes has lain across the top of a glass jar with the limbs all stretched out, without the least motion or indication of sensation, yet reflex action is retained, for if the nostril be irritated the eye of the same side becomes depressed; seventy minutes, this is lost; seventy-five minutes, dead.

Body opened immediately.—Strong odour of the poison; lungs much distended; heart moderately full, pulsated thirty-eight per minute; ventricle emptied at the time; pulsation soon sunk to sixteen; at ninety minutes, one drop of acid being put upon the heart its motions quickened to eighteen per minute, but the ventricle now not nearly emptied; two hours and a half, up to this time has continued to pulsate, varying from ten to twenty pulsations per minute, it has now ceased, but on being touched with the point of a needle again contracted for a few times; having ceased, another drop of acid was put upon it, when its action was again immediately induced; the motion of the auricles did not finally cease until after upwards of twenty-eight hours.

No. 109.—Gave to each of two frogs, not quite half grown, two minims of acid: they leaped about most vigorously, but in two minutes became dull and feeble; in fifteen they lay with the limbs extended and paralyzed, without sensation, but with some reflex action; the following morning they were found dead and rigid, apparently not having stirred from the spot they were left in. The heart of one was perfectly empty, and that of the other nearly so, and of both contracted.

No. 110.—Moderate-sized frog. Gave thirty minims of acid: not quite all swallowed, as the throat became paralyzed; it seemed dull and flaccid, but on being put down leaped a distance of one foot and a-half three or four times in succession; two minutes, gave ten minims more; fauces paralyzed; leaped a foot in distance on being put down; seven minutes, unable to move, lies with the limbs outstretched, flaccid, and helpless; thirteen minutes, dead.

Opened.—No motion of heart; ventricle empty and contracted; auricles somewhat distended.

No. 111.—Large toad. Gave ten minims of acid. In less

than two minutes opened: auricles and ventricle very much distended, they pulsate regularly twelve to fourteen per minute, but scarcely any blood is propelled into the vessels; twelve minutes, right auricle contracts much more vigorously than the left; cavities not nearly so much distended; ten hours, the ventricle empty and rigid; auricles filled, the right still contracts.

No. 112.—The following experiments show the effects upon toads of different quantities of acid, when administered by inhalation:—No. 1 put into a covered jar, into which two minims of acid had been dropped: in one hour it was dead. Opened at this time. All the cavities of the heart completely distended with florid blood, as were the veins; abdominal viscera much congested; vessels of the lungs most beautifully shown, on account of their distention; on being touched, the heart immediately began to contract, but was unable to empty itself; twelve hours after, the ventricle was contracted and empty, the auricles still acting and containing blood.—No. 2 put into a similar jar, with five minims of acid: in an hour dead. Cavities of heart, especially the ventricle, distended, with *bright florid* blood; although the heart contracts, it does not appear to propel any blood into the aorta; indeed, on their being divided near the heart, scarcely any blood escaped; all the viscera, as well as the lungs were filled with blood. Twelve hours after, ventricle empty and dense, auricles contracting and not so full.—No. 3 put into a similar jar, with ten minims of acid: in an hour dead. Heart distended, but especially the auricles, with *dark blood;* lungs, viscera, and veins, congested; the aorta empty; the right auricle, when pricked slightly, contracts; the left does not; the ventricle does not pulsate, but in five minutes became quite empty, dense, and white.—No. 4 put into a similar jar, with twenty minims of acid: in an hour dead; heart does not pulsate, nor can it be made to do so; ventricle perfectly shrunk, empty, and white; auricles contain some blood, but are not much distended; lungs and other viscera not so much congested as in the three former instances. The lungs of all the four were enormously inflated.

Soon after being put into the jars the toads became dull and indisposed to move, with laborious breathing; they were not convulsed, and the quantity of acid did not appear to produce any very marked difference either in the violence or the rapidity of

action of the poison, though this was somewhat greater when the larger quantity was employed.

To compare the appearance of the heart and lungs with that found after pure asphyxia, I put a frog and toad into a jar of water, and kept them at the bottom by a weight. All the cavities of the heart were excessively distended with black blood, the appearances, especially of the ventricle, being very different from those after death from hydrocyanic acid; the lungs, also, were more congested.

No. 113.—Two small Prussian carp (*Cyprinus Gibelio,*) were put into a large basin containing three pints of water, to which twenty minims of acid had been added: in twenty minutes they began to be dull, and to fall upon the side for a minute or two; they then roused up and swam vigorously about for another minute or two; the dullness, however, gradually increased, and the periods during which they remained upon the side longer; but if touched, they would still dash actively away, until one hour and a-half had elapsed, when I left them lying altogether upon the side. The following morning, eight hours after they were put into the water, they were found dead and rigid, and had evidently been dead for some time. Taken out, and two others of the same size put into the same water: in half an hour these began to fall upon the side, and to breathe laboriously, lying still upon the side and moving about alternately for six hours, after which, up to twelve hours, they moved but little; they now roused up, and swam about a good deal upon the back or side. Twenty-four hours, lying perfectly still, with only a *very* feeble motion of the gills; put into fresh clean water, when they *immediately* revived, and swam about in a natural position, but soon fell again upon the side; during the day they laid upon the side as though fast asleep, and with gentleness could be handled without being disturbed; but if roused they suddenly dashed away: in thirty-six hours appeared to be perfectly recovered.

No. 114.—Same-sized fish. Put two minims of acid into the mouth, and immediately replaced it in a large basin of water. It fell upon the side, but in a minute nearly righted itself; however, the least touch made it lose its balance, and it was inactive; thirty minutes, seemed better, though it was very feeble; twelve hours,

swimming actively about, a little on one side, otherwise not much the worse; twenty-four hours, as well as ever, except not quite so vigorous.

No. 115.—Gave three minims to a carp of the same size as last: it swam actively about for two minutes, then fell flat and still upon the side; twenty minutes, has several times suddenly dashed forwards and about the water in a convulsive manner; this it continued to do for some hours; twelve hours, lying flat and still, feebly breathing, with the mouth open, but if touched can move; during the day continued to improve, and at twenty-four hours, though lying upon the side, frequently swims about, apparently likely to recover; next morning, thirty-six hours after, found dead, but not rigid.

No. 116.—Put five minims into the mouth of a similar sized carp: less affected than last; twenty-five minutes, certainly convulsed; one hour, again convulsed, dashing furiously through the water; twelve hours, swimming about on the side; during the day improved, and at twenty-four hours appeared well, but weak.

No. 117.—Same-sized carp. Gave five minims of acid: it immediately dashed most violently about the water; continued at intervals to do so for three hours, like No. 118, but more actively; twelve hours after, lying dead. The dashings about in the water of this little fish were most violent. All the cavities of the heart were empty, the bulbus arteriosus being white.

No. 118.—Larger carp than the others. Gave ten minims of acid: it immediately breathed laboriously; moved quickly about the water, and in two minutes was convulsed, then lay flat upon the side, but almost immediately swam actively about; it continued for three hours alternately lying perfectly still upon its side and suddenly dashing violently about the water, becoming, however, more feeble, and the intervals between moving longer; next morning, twelve hours after, lying upon its side at the bottom of the vessel so motionless that I thought it was dead, until I took it out of the water, when it began to move and to breathe; on being replaced in the water it continued to move at intervals up to seventeen hours, when it died. All the three cavities of the heart completely empty.

No. 119.—Small carp. Put five minims of acid upon the gill: respiration was instantly affected; it opened and shut the mouth

in rapid succession; when put in the water it lay flat upon the side, as though about to die, but in twenty-five minutes revived, became stronger, and moved actively about; twelve hours, lies on the side, but swims about; gradually during the day became duller; at twenty-four hours, breathes quickly, but scarcely stirs, though it can change its position; it may, however, be rolled over without appearing to perceive it. In the morning, thirty-six hours after, found dead and rigid. Cavities of heart all empty.

No. 120.—Same size as No. 118. Put ten minims of acid upon each gill: it swam actively about, but soon became restless, with short convulsive startings from one side of the vessel to the other; for three hours this fish continued, at frequent intervals, the most violent irregular motions; it was several times nearly out of the vessel, though the water was at least three inches from the top, and this was splashed all over the table; the movements, however, became less violent; it swam about on the side, sensible and tolerably active, but during the day got gradually weaker, stiller, and more insensible, but did just move the gills up to twenty-four hours.

No. 121.—In order to ascertain if doses of different strength act with proportional rapidity, I made the following four experiments:—

To a small carp I gave thirty minims of acid, but could not get quite all swallowed as the parts became paralyzed: it was affected while swallowing, but on being put into water it swam about; twenty-five seconds, became unsteady, then still for ten minutes, when it appeared more active and dashed about, but soon became dull and indisposed to move; dead in four hours.

To a carp of the same size I gave twenty minims of acid: when put into water it was instantly convulsed for a minute, then still; these alternations were repeated at intervals; dead in three hours and a-half.

To a carp of the same size I gave ten minims of acid: in one minute it was floating upon its side, much drawn towards one side; it continued tolerably active for some hours, swimming about upon the back or side, and if touched moved quickly; the following morning it was quite well.

To a carp of the same size I gave five minims of acid: it was instantly convulsed; continued as the preceding; at three hours

and a quarter no motion, except very feeble respiration; at four hours and a quarter dead.

In the whole of these four fish the cavities of the heart (auricles, ventricle, and bulbus arteriosus,) were empty, as was the aorta.

From these fish being immediately returned to the water it was impossible to say if some portion of the acid might not be, almost as soon as given, washed away; and also it was difficult to say what influence the water, passing not only over the body but through the mouth and gills, might have; so that though these experiments were sufficient to show that hydrocyanic acid acts in a similar way upon fish as upon the higher vertebrata, they could not, from these circumstances, be regarded as altogether satisfactory, in accurately comparing the effects of corresponding doses upon different animals. I therefore made the following:—

No. 122.—To a small carp I gave two minims of acid, and kept it out of the water for thirty seconds: when put in, it rolled from side to side, and appeared about to die, but soon recovered, and swam unsteadily in sudden starts, gradually becoming weaker; it died in six hours.

No. 123.—Four small carp, of the same size, were removed from the water and placed upon a table. To No. 1 nothing was done: it lived for an hour and forty minutes,* at least, it was this time before it altogether ceased to move when taken up, but for the last thirty minutes it scarcely moved more than the mouth and opercula when faintly breathing.—To No. 2 I gave five minims of acid: it was convulsed most violently, so as many times to jump from the table; after thirty-five minutes it moved but little, and after forty-five minutes did not stir the opercula, but up to an hour, when lifted up by the tail, was slightly moved.—To No. 3 I gave ten minims: like the last it was most violently convulsed, so as to jump from the table; it did not, however, move so much as No. 2, though it did not altogether cease to move the mouth and opercula until eighty minutes, but during the last thirty minutes the movements were very slight.—No. 4 had ten minims put under the right operculum: it was at once most violently convulsed, then lay as though dead, but when handled,

* The extreme tenacity of life in the carp is well known to naturalists, and therefore renders this fish, perhaps of all others, the best adapted for such an experiment.

moved convulsively, though feebly; these motions did not completely cease until forty minutes.

No. 124.—Two small carp, of the same size; one was placed in an empty jar: it lay as though dead for upwards of two hours, but when put into water soon became active and apparently well, however, it died in a few hours. The other was put into a jar into which two minims of acid had been put: in forty minutes it was dead, there having been scarcely any motion after fifteen minutes.

No. 125.—To each of two moderate sized minnows (*Leuciscus phoxinus,*) one minim of acid was given: one died in fourteen, and the other in sixteen minutes, having been similarly, but not quite so convulsively, affected as the carp.

No. 126.—The active lively trout (*Salmo Fario,*) appears to be more easily affected by the acid than some other fish. To one just caught, weighing about six ounces, six minims of acid were given: it was dead in eight minutes; and another, weighing about ten ounces, to whom five minims of acid were given, was dead in ten minutes.

No. 127.—Put thirty water snails (*Lymnæus stagnalis,*) with four of the small flat spiral snails (*Planorbis Spirorbis,*) into a pint of water with twenty minims of acid; in a short time the animals retreated with their shells, and threw out some mucus; after twenty-four hours they were all living, and did not appear to have suffered materially.

No. 128.—Two garden snails (*Helix aspersa.*) Put three drops of acid upon the foot of each: instantly a large quantity of mucus was exuded, and the animals appeared in pain; but after lying within the shell for a short time they crawled away, and were not the worse on the following day.

No. 129.—Four snails (two *Helix aspersa* and two *Helix nemoralis,*) were put into a small covered garden-pot, in which there was a little dry mould; upon this ten minims of acid were dropped: at first little or no effect was produced, but after a few hours they became dull and quiet, and the following day were dead.

No. 130.—Three drops of acid were put upon the mantle of one large black slug (*Limax ater,*) and three upon the foot of another: both immediately curled themselves up, rolled about, and threw out mucus, but in a short time appeared no worse for the acid.

No. 131.—Four large black slugs were allowed to crawl about until the respiratory aperture was fully opened. I then attempted to drop into each one drop of acid. In consequence of the drop not falling exactly true, and the instantaneous manner in which the aperture is closed, not nearly the whole of the drop passed into the respiratory cavity: at the instant all appeared to suffer, but in two or three minutes they seemed nearly recovered, two, into which, perhaps, nearly half a drop had passed, being dull. They were all put into a glass jar: in two hours they were found to have crawled about, having left more mucus than usual in their tract; they were now still and dull; in the morning all were lying dead at the bottom of the jar.

This experiment I repeated upon two other slugs, hoping to succeed more perfectly in dropping in the acid; in one the drop, for the most part, passed into the lungs, in the other not quite so well; the first was dead in four hours, the second, in eight.

No. 132.—Four full-grown black slugs were put into a pint glass jar with some leaves; into the jar two minims of acid had been put: in the course of an hour they began to exude mucus; in four hours one was dead, and the others very dull and still; in twelve hours they were all lying dead at the bottom of the jar.

No. 133.—A small black slug was placed in a two-ounce phial, into which two drops of acid had been put: it scarcely moved from the spot it was upon, soon threw out mucus, and in thirty minutes was dead. The same result took place with the small slug of gardens and fields, (*Limax agrestis.*)

Shortly after death the slugs became soft, and appeared as though melting into thin watery mucus.

No. 134.—Ten worms (*Lumbricus terrestris,*) of various sizes, were put into a small vessel with three ounces of moist earth, with which ten minims of acid had been mixed: in a short time they were found rolled together, covered with mucus; in rather more than an hour they were dead. Ten more were put into a similar vessel, with a like quantity of acid, but without the earth: the effect was the same, except rather more speedy. Ten were put into one ounce of water, containing ten minims of acid: at first they moved actively about and tried to escape; they soon became dull and flaccid, sank to the bottom of the jar, and in about the same time as the last died.

No. 135.—A large millipede (*Geophilus subterraneus,*) was put into a two-ounce phial, into which two minims of acid had been dropped: it was soon affected; in rather less than an hour it was dead.

No. 136.—Three centipedes (*Oniscus Asellus,*) were put into a phial with a like quantity of acid: they ran about only for one minute and a half, after which they did not move.

A caterpillar (the larva of the tiger moth,) was put into the phial with the last: it moved but little from the place it was put upon, and was dead in seven minutes.

No. 137.—A caterpillar (I do not know of what insect,) was put into a two-ounce phial, with one drop of acid: in five minutes it appeared dead; its fæces had been passed; it was taken out and laid upon a sheet of paper; in half an hour it moved a little; it gradually acquired more power, and in three hours had recovered. It was placed in a jar, with some leaves, upon which it crawled actively and fed: one drop of acid was put at the bottom of the jar; in two minutes it became dull, passed fæces, and soon fell; at six minutes it did not stir.

No. 138.—Five small caterpillars (*Papilio Brassicæ,*) were put into a two-ounce phial, with one drop of acid: they immediately rolled and twisted about; in twenty-five seconds they were still, and did not afterwards move. In other experiments with this caterpillar I have found the same effect rather longer in taking place.

No. 139.—The larva of the common fly is much less easily affected than the perfect insect itself. A number were put into a jar, with ten minims of acid: they immediately became very active, as though suffering; after half an hour they were still, but lived for nearly three hours. The common fly is very easily affected; it is sufficient to hold one for five seconds over the mouth of a phial containing the acid; it becomes paralyzed, and generally does not stir; if put into a phial containing a small quantity, it is almost immediately powerless and still; if removed before dead, the wings or legs, or both, are rapidly moved. The common butterfly (*Papilio Brassicæ,*) is as easily affected; so also are bees and wasps, and many other insects which I have tried.

No. 140.—Ten spiders (five long legged and five short,) were put into a similar phial, with two drops of acid: in from fifteen to thirty seconds they became incapable of crawling, and the short

legged did not stir after two minutes, but the long legs of some of the others continued to move for four hours. It is well known that the legs of this spider very easily become detached, and also that they are endowed with great tenacity of vitality, continuing to move for long after being detached from the body of the animal. If the spider is allowed to remain exposed for five minutes or so to the vapour of the acid, no motion is perceived; but if not for so long a time, then, though the body is perfectly still and insensible, the legs will continue to move for hours. Two of these spiders, after laying paralyzed for five hours, recovered sufficiently to crawl a few inches, some of the legs being still paralyzed. The next morning, fifteen hours after exposure to the acid, they appeared well and active, having the power to use all the legs.

It is a curious fact, that though the application of the acid to a detached leg will certainly induce an earlier cessation of motion, it appears to produce much less effect than when the limb remains attached to the entire creature. This, taken in connection with the fact of acid applied directly to the heart of a toad not inducing a cessation of action, as well as the condition of the heart, as shown in the post-mortem examination of other animals, would seem clearly to establish that it is upon the central nervous system the acid specifically acts.

No. 141.—Three cockroaches, (*Blatta orientalis,*) with three slow-legged beetles, (*Blaps lethifera,*) were put into a small jar, with two drops of acid. They tried to escape, but almost immediately became stationary and weak, particularly the active cockroaches, which in eighteen seconds were unable to run; the legs were moved with a quick convulsive motion, but these did not stir after one minute, nor the beetles after two. At five minutes they were removed from the jar and laid upon paper. After two hours I perceived a slight motion in one leg of one of the beetles, and placed it in a box; after six hours it could stir all the legs, but could not stand; in nine hours could just crawl upon its fore legs, the two hind being paralyzed; in twelve they were able to be moved a little; in fifteen it could crawl better, but seemed unable to direct its course; in twenty-four hours it had entirely recovered. On being placed in the same jar for three minutes it did not move afterwards.

It is curious to observe the effects of the acid upon these

insects. If a wasp be actively moving against the window, and an open bottle of the acid be held under it for four or five seconds, its motions almost immediately become less vigorous, its wings and legs gradually, but rapidly, become quiet, and for a moment it hangs to the glass by one or two feet, then drops dead.

I should venture to recommend the vapour of hydrocyanic acid to the entomologist, as a far better mode of destroying his specimens than any hitherto suggested. It acts more speedily, apparently occasions little or no suffering, does not affect the colour, and any position may be given to the insect.

The following experiment, though long, is very interesting. It shows most decisively that hydrocyanic acid is not cumulative, but on the contrary, that like many other poisons the system may by use be enabled to bear doses of it, which at first would have been destructive. It also shows that at times the effects of hydrocyanic acid *are very similar to those produced by opium*, far more so, indeed, than some writers upon medical jurisprudence would lead us to suppose.

No. 141*.—*September 6th.*—Male cat, rather more than half-grown, placed in the jar with two minims of acid: in one minute he began to be convulsed, and was immediately taken out insensible, but with the reflex action good; four minutes, howled frequently; ten minutes, becoming sensible, nose plunged two or three times into cold water without much effect; thirty minutes, has lain perfectly still without stirring, but now, on being patted, he took notice, and in a few minutes walked; he repeatedly passed water, and was freely purged; he continued weak and indisposed to move, but in two hours and a-half was able to play with another cat.

Twenty-four hours, blood examined with the microscope; perfectly normal.

September 7th.—Twenty-four hours after, experiment repeated in the same manner. He evidently instantly recognised the smell of the acid, and made most desperate struggles to escape. At fifty seconds he managed to push off the heavy weight upon the jar, and got the head and fore legs over the edge of it, when he was instantaneously seized with a strong convulsion, and fixed across the jar: he was laid upon the floor, where he continued perfectly rigid for two minutes, and passed water and fæces very freely,

when he rose and crawled a little distance to a warm mat, where he laid down and remained still, and apparently in a comfortable doze for three quarters of an hour, at which time he appeared well again.

September 8th.—Twenty-four hours interval, has been active and cheerful all day. Experiment repeated: in forty-six seconds he became affected, fell, and was strongly convulsed; one minute, taken out; he lay perfectly paralyzed, with sensation and reflex action lost, up to twelve minutes, when a few drops of water were put into the ears, which occasioned a sudden moving of the head; and on a little being put into the mouth it was convulsively swallowed; a slight convulsive movement in the limbs now took place; this continued to increase, and the muscles to acquire more power, until twenty-five minutes, when all motion ceased and he was again paralyzed, being perfectly sensible, both seeing and hearing, but unable to stir a limb; forty minutes, has gradually improved; has been covered with cloths, which appear very grateful to him; now lies shivering, as though in an ague fit, placed in a warm corner near the fire; immediately he began to purr and seemed much pleased; two hours after he was much as usual, only weak; on a piece of meat being given, though he appeared very hungry, it was with great difficulty eaten; at the early part of the experiment the respiration was laboured and panting; at the latter, very rapid and feeble; both fæces and urine were passed.

September 9th.—Has been active and playful all day. Twenty-four hours after last experiment, blood examined and found to be perfectly natural. Experiment repeated: kept in the jar *three minutes* without any effect being produced, having set himself down and appeared quite at his ease; on being removed there was considerable straining to pass urine, with some protrusion of the penis and rectum. The jar was found to be rather moist, which might prevent the ready volatilization of the acid, and thus acconnt for so little effect being produced.

September 10th.—Twenty-four hours interval. During the day has been perfectly well and active, with a good appetite. Experiment repeated: at one minute and three quarters made great exertions to escape up to two minutes and a-half, when he was violently convulsed; three minutes, taken out; he immediately shrieked loudly, became paralyzed and insensible, but with reflex action remaining he lay perfectly still for six minutes, when

some little convulsive movement took place; this increased, with loud howling, the respirations becoming very rapid; twelve minutes, there is some little sensation; forty minutes, for the last five minutes he has been busy licking his coat, and now seems nearly well again; the heart acts 125 per minute, with a feeble, tumultuous, and somewhat irregular beat; respiration about sixty per minute, with the murmur very loud; fæces, but not urine, were passed.

September 11*th.*—Twenty-four hours interval. Has been perfectly well all day: blood examined, quite natural. Experiment repeated, a trifle more acid being used: no effect until two minutes and a quarter, when he made very violent attempts to escape, and the respiration became hurried; three minutes, just began to be convulsed, the cover was removed, and he dashed forwards to spring out of the jar; at the moment he was seized with convulsion, and hung balanced across the edge of the jar for half a minute, then fell and lay paralyzed and insensible for a minute and a quarter, when on being taken hold of he howled loudly, roused up as from a deep sleep, and looked about as though frightened; in five minutes he was able to walk, but much preferred to sit crouched in a warm place, and on being noticed appears very pleased and purrs very loudly; urine, but not fæces, passed.

September 12*th.*—Well and active all day. At twenty-four hours interval experiment repeated; same quantity of acid used as last night: in one minute and a quarter affected; he became strongly convulsed with the mouth intensely red; three minutes, removed from the jar, having for the last minute lain perfectly quiet and only breathed twice; both urine and fæces passed in the jar; when removed he began to breathe quickly and convulsively; sensation and reflex action lost; fifteen minutes, has lain perfectly still and motionless; purged three times; muscles now show some little convulsive motion; twenty minutes, reflex action restored; twenty-five minutes, some little sensation; thirty minutes, now conscious, but without the least muscular power; respirations upwards of eighty per minute; thirty-nine minutes, some little muscular power; howls most horribly, especially if disturbed; put by the fire, as he appears to be very cold; two hours and a-half, for the last two hours has lain *in a state very similar to that of a person who has taken a large dose of opium,* appearing to be overpowered with sleep; can be rolled from side to side from one end of the

room to the other without rousing him or his making the least effort; but he howls as though not liking to be disturbed; both fæces and water freely passed.

September 13*th.*—Twelve hours after. During the night he had crawled into an adjoining room, and was found lying upon a piece of carpet; is perfectly sensible, but moves with the greatest difficulty; in attempting to walk his motions are most curious, he possesses hardly any control over the limbs, and stands with the hind legs widely apart, unable to stir. During the day he took some milk most greedily, and lay for some time with his nose at a piece of bread as though he wished to eat it, but could not; twenty-four hours, cannot move so well as in the morning; he has with great exertion managed to get out of a small box three or four times, when he falls down without being able to rise, but can push and drag himself upon his side by the carpet across the room; if his feet are pressed against he pushes with tolerable power, and, for the instant, will move the head suddenly, but he has a great disinclination to move, and lies as though in a sound sleep, breathing deeply and regularly; if caressed he immediately purrs. He has been several times purged, and the rectum and penis protrude. There appears rather to be a want of regularity and control over the nervous energy than any absolute loss of the power of contraction in the muscles. Some meat was given, and though he appeared most eager to eat, he made not the slightest effort to get it into the mouth; on examination I found the jaw firmly closed; the meat was cut up into small morsels and put into the mouth; if forced near to the fauces it was swallowed most voraciously, with every appearance of satisfaction. Blood natural.

September 14*th.*—Thirty-six hours after, much the same as last night, cannot stand, but has taken, with much difficulty, a little milk; forty-eight hours, limbs in the same state; offered some milk, with which he appeared pleased, but could only get up a few drops; about two ounces were put into the mouth by means of a teaspoon, this he eagerly swallowed; afterwards he could lap a little milk.

September 15*th.*—Sixty hours, improved, can now walk with only occasional falling head foremost; seventy-two hours, can get over the ground rather faster than in the morning, but falls and lies perfectly helpless for some time, then goes staggering about;

in whatever position the limbs may be placed there they remain for some minutes; if he be steadied by the skin of the back being taken hold of he can get on much better; meat and milk have to be put into the mouth, when they are voraciously swallowed. He appears not to be able to find the food even when placed close to his nose, perhaps from the sense of smell being injured.

September 16*th.*—Eighty-four hours, improved; can now walk without falling, unless touched; eats most voraciously, and begins to clean off the dirt which has remained upon him for some days.

September 17*th.*—One hundred and eight hours, is now nearly well, except being weak, but he can run, is more disposed to move, and if called to will come.

September 18*th.*—One hundred and thirty-two hours after last experiment being nearly well it was repeated: not affected for one minute and a-half, when he breathed rapidly; two minutes, convulsed; two minutes and a-half, paralyzed; three minutes, taken out insensible, but with reflex action; in three minutes more this was lost; he lay paralyzed, breathing rapidly up to ten minutes, when he gradually became more strongly convulsed, howling repeatedly; at twenty minutes he became sensible, and soon after tried to get up, but rolled over; twenty-five minutes, was able to crawl to the mat from which he had rolled; thirty minutes, quite sensible, but will not stir. Blood perfectly natural. He was purged and passed water repeatedly.

September 19*th.*—Has been, during the day, active and has eaten most voraciously when the food is put into the mouth, but is altogether incapable of finding it. Twenty-four hours interval experiment repeated with rather more acid. He showed not the least symptom of being affected for two minutes, and was not convulsed until two minutes and three quarters, and when taken out, at three minutes, was not altogether insensible; in three minutes after being removed could stand, and in five minutes he could walk a few steps; in half an hour he walked down stairs. Blood examined and compared with that of a strong healthy young cat; both were alike.

September 20*th.*—Twelve hours interval, can walk, and is able to jump off a table without falling, but does not like to move. Experiment repeated: in one minute was convulsed, but the convulsions showed much less power than before; three minutes, taken out of the jar perfectly paralyzed, insensible, and without reflex

action; in four minutes the pupils became most intensely dilated, but two minutes afterwards they were not nearly so much so. The heart beat, feebly, upwards of one hundred per minute; there was not *the least trace of pulsation in the carotid arteries.* I thought for some minutes he would die, but he soon rallied; in fifteen minutes he was sensible, and in twenty-five minutes able to walk a few steps.

September 20th, four p.m.—Seven hours after last experiment it was repeated; no effect for two minutes and a-half, when he was convulsed; at three minutes, when taken out, he was unable to stand, but consciousness was not lost, and in five minutes, except weakness, he was recovered. The heart beat very feebly, and the pulsation of the arteries could not be felt, indeed, the circulation for many days has been very weak.

The following experiments upon plants were made by putting either a cutting or small root into an ounce and a-half phial filled with water, with which six minims of acid had been mixed, corresponding cuttings and roots being placed in similar phials filled with the same water, but without the acid. The phials were placed in two adjoining rooms, in order to completely prevent any effect from the evaporation of the acid upon those plants which were put into the water. The circumstances of air, temperature, and light, were exactly alike:—

NAME OF PLANT.	EFFECT IN ACID.	EFFECT IN WATER.
Cutting of black currant, (*Ribes nigrum.*)	In five days leaves dry, shrivelled, and brown.	Leaves drooping, but not dead.
Sprig of jasmine, in flower, (*Jasminum officinale.*)	In seven days drooping, much faded, but not quite dead.	Alive and green.
Cutting of common lilac, (*Syringa vulgaris.*)	In seven days stalk, leaves, and buds dead and dry.	Leaves dead, but buds quite green.
Root of pansey, in flower, (*Viola tricolor.*)	In seven days dead. This died sooner than in the water, but was not so decidedly affected as some others.	Seven days dead.
Small root of parsley, (*Apium Petroselinum.*)	Ditto.	Ditto.
Small root of groundsel, (*Senæcio vulgaris.*)	In two days drooping and faded; in five dead. Another root placed in a phial, with double the quantity of acid, (twelve minims,) was affected in five hours, and in twenty-four nearly dead.	In five days moderately green, but faded and drooping.
Root of the chickweed-leaved willow herb, in flower, (*Epilobium alsinifolium.*)	Dead in two days. Another root in a phial, with twelve minims, was drooping in four hours, and soon died.	Dead in four days.
Shoot of London pride, (*Saxifraga umbrosa.*)	In twenty-one days lower leaves brown and dead; upper, green and vigorous.	Thirty days quite fresh and healthy.
Flower of the common dianthus, garden pink.	Dead in twelve hours.	

In the following the strength of the acid was increased to ten minims in the ounce and a half of water :—

NAME OF PLANT.	EFFECT IN ACID.	EFFECT IN WATER.
A cutting of heliotrope, (*Heliotropium Peruvianum.*)	In four hours the scent was nearly lost; in thirty-six drooping and faded; in forty-eight quite dead.	In three days still some scent, but rather faded; seven days dead, and brown in colour.
Stalk and flower of African marigold, (*Tagetes erecta.*)	In three days petals curled up and shrunk; seven days dead and mouldy.	In three days quite fresh; seven days lower petals dead, others fresh; nine days all dead.
A small branch of stock, in flower, (*Cheiranthus incanus.*)	In forty hours dull; three days whole flower drooping, and the separate petals, particularly of the lower flowers, shrivelled up, lost their colour, and dead; seven days mouldy.	In three days quite fresh; seven days flowers faded and nearly dead, but the stalk and leaves fresh and green.
A branch of common scarlet geranium, in flower.	In forty hours faded, leaves and flowers drooping; three days flowers shut up, and petals falling off; seven days dropping to pieces.	In three days quite fresh; seven drooping, but colour clear and bright; ten days all dead.
A branch of common tansey, in flower, (*Tanacetum vulgare.*)	In forty hours drooping, with lessened scent, but leaves quite green; three days leaves withered, flowers dirty-looking, with scarcely any scent; seven days leaves and stalk brown and shrivelled up.	In three days perfectly fresh; seven days flowers faded, but the leaves and stalk fresh; ten days these much faded.
A cutting of common garden rose.	In forty hours dull, but the leaves green and moderately upright; three days leaves faded, drooping, and many of them covered with brown spots; seven days nearly the whole surface of the leaves and stalk dry and brown.	In seven days perfectly vigorous; ten days green, but drooping.
A cutting of musk plant, (*Mimulus moschatus.*)	In four hours scent nearly lost; forty, nearly, but not altogether, faded; three days beginning to rot.	In three days perfectly fresh and has grown; seven days quite fresh and green, but not in so full flower; ten days quite alive.
Small branch of marsh mallow, in flower, (*Althæa officinalis.*)	In three days much faded and very drooping; seven days shrivelled and dried up.	In three days flowers a little faded, otherwise perfectly fresh; seven days flowers dead, but stalk and leaves green and fresh; ten days ditto.
Slip of garden verbena, in flower.	In forty hours somewhat faded; three days leaves curled up, flowers dropping off, and the plant altogether shrivelled up.	In three days some of the flowers dropping off, otherwise perfectly fresh; seven days flowers gone, leaves and stalk fresh; ten days ditto.
Flower of a petunia.	In forty hours quite dead; three days beginning to rot.	In three days quite fresh; five days dead.
Slip of heath, in flower, (*Erica cinerea.*)	In forty hours not much affected; three days quite dried and crisp.	In seven days flowers dead, but leaves and stalk green and living; ten days ditto.
Flower of Indian nasturtium, (*Tropæolum majus.*)	In four hours brighter than that in water; in twenty-four hours quite withered.	In twenty-four hours withered, but not so much as that in the acid.

The following were put into a phial with thirty minims of acid:—

NAME OF PLANT.	EFFECT IN ACID.	EFFECT IN WATER.
Nasturtium.	In four hours faded; twenty-four dead.	
Verbena. Chickweed-leaved willow herb.	In forty hours very drooping, but not dead; three days withered.	
Flower of a petunia.	In forty hours dead.	

*** In seven days the four were all mouldy.

The following plants were placed in a glass jar (pint and a-half,) into which ten minims of acid had been put, the top of the jar being closely covered over; corresponding plants were put into a similar jar without the acid:—

	WITH ACID.		WITHOUT ACID.
NAME OF PLANT.	IN TWENTY-FOUR HOURS.	IN THIRTY-SIX HOURS.	IN THIRTY-SIX HOURS.
Flower of nasturtium.	Much shrivelled.	Dead, but colour retained.	Nearly as fresh as when gathered.
Cutting of rose.	Leaves dull and rather brown.	Sap exuding from stalk; the leaves all dry, and of rusty brown colour.	Rather dry, but otherwise perfectly fresh.
Cutting of lilac.	Dry and faded.	Leaves dry and shrivelled up; dirty brown in colour, with small white spots upon them.	Leaves rather dry, and somewhat shrivelled up, colour good.
Cutting of black currant.	Dull and faded.	Shrivelled, dry, and brown.	As when cut from the tree.
Pansey in flower.	Not very much affected.	Colour of flower good, but the stalk and leaves perfectly faded and powerless.	Nearly as when gathered.
Cutting of ivy.	Not much changed; rather dull.	Faded and shrunk; perfectly powerless.	Fresh as when cut.
A piece of mignionette, in flower.	Faded, dull, and colour changed.	Perfectly shrunk, powerless, and of a brown-yellow colour; no scent.	Green, fresh, and with scent.
A sprig of jasmine, in flower.	Ditto.	Ditto, but not to quite the same degree.	Ditto.
A piece of groundsel, in flower.	Soft, dull, and faded.	Perfectly shrunk, brownish-green in colour, and wet.	Rather faded, but no other change.

*** The above had so shrunk, and lost all erectibility and vigour, that at thirty-six hours they did not occupy half the space in the jar they did at first, and by a little pressure not one-fourth.

The above experiments will probably be regarded as sufficiently numerous to show that hydrocyanic acid affects vegetables generally. Though these cannot be considered as equally with animals susceptible to its influence, still it is evident it acts as a deadly poison. The most remarkable effect of the acid, whether the plant be exposed to the influence of the vapour, or be put into a weak solution, so that it may be absorbed within the tissues, is the complete prostration of all the power of the plant; it becomes shrunk, feeble, and dry; or if it be a succulent plant, moist, often with the sap exuding from the stem. The condition of the plants strongly resembles that of animals when in a state of paralyzation from a dose of the acid, or the extreme flaccidity immediately after death, before the commencement of rigidity. The acid soon disappears, being either decomposed or absorbed; for after a few hours, in all the experiments no smell of it was perceptible.*

* These experiments, it will be seen, confirm those made by Marcet, Christison, and Turner, and others, as to the action of different poisons upon plants being very

POST-MORTEM EXAMINATIONS.

Four dogs were placed upon the boarded floor of a closet, under the roof of a large room; the weather was hot and dry, and from being just under the roof, they were exposed to the action of the sun. Two were examined on the sixth day, and two on the seventh day, after death. In all, putrefaction had very far advanced; indeed, they were perfectly putrid and horridly offensive. The contents of the stomachs were collected and distilled; the stomachs were also cut up and placed with distilled water in another retort. There was not the least trace of acid in the liquid from either retort.

Examination of five dogs forty-three hours after death.—To two of them iron had been given, (No. 51 and 52;) one had been placed under the douche, (No. 37;) one had had the acid by the mouth, having on the previous day had it by the vagina, but not sufficient to destroy it, no antidote or remedy having on either occasion been used, (No. 12 and 40;) and the other had been destroyed by having had the acid introduced into the rectum, (No. 22.) The quantity of acid which had been given was, No. 51, ten minims; No. 52, ten minims; No. 37, five minims, a smaller dog than either 51 or 52; No. 12 and 40, having had before death seventeen minims of acid, viz., twelve minims by the mouth, and the day before about five by the vagina, also less than these two, but larger than No. 37; and No. 22, six minims by the anus, of the same size as No. 40, but not so old a dog. The smell was beginning to be offensive, though all were very stiff and rigid. The muscles were natural in colour and appearance. In No. 51 and 52, where the iron had been given, there was the greatest change; the least, in No. 22 and 37; indeed, in these, especially No. 37, there could hardly be said to be any disagreeable smell. In all, the liver was soft; there was no alteration in the gall-bladder; the spleen natural; the stomach much contracted, and the mucous membrane red; the lungs were

similar to those upon animals. Dr. Lindley, in his *Introduction to Botany*, p. 295, has referred to some experiments made by M. Macaire, on the effect of poisons upon plants, and amongst them of hydrocyanic acid; but the poison having been used in a comparatively concentrated condition, so good an opportunity for judging of its effects was not, in my opinion, afforded as in those above related.

not engorged, but appeared *shrunken and contracted*; heart distended on both sides; blood in it equally dark in all the cavities: in one dog, fluid; in the others, loosely coagulated. The stomachs of No. 51 and 52 contained plenty of iron; the stomachs of these two were cut up, washed with distilled water, and with the contents distilled in separate retorts. There was not the least trace of hydrocyanic acid, neither was there among the contents any appearance of Prussian blue. The stomachs of No. 12 and 37 were also cut up, washed, and, with their contents, distilled. The distilled fluid yielded a very faint odour of hydrocyanic acid; and the nitrate of silver, as well as sulphate of iron tests, showed slight, but still decided traces of it.

As it appeared desirable to ascertain the condition of the head and spinal marrow at or soon after death, I made the three following examinations:—

No. 23.—Bull terrier examined nine hours after death. Blood fluid and dark; muscles excessively rigid; no unusual injection of the spinal cord or its membranes, nor of the brain.

No. 79.—Where death had been delayed after the first dose. Examined immediately the heart had ceased to beat. Brain natural, not injected; some *little* clear serum upon the surface and in the ventricles; sinuses quite full of dark blood. The pia mater congested, as was the theca of the spinal marrow, though it was rather the vertebral sinuses which were full of dark fluid blood than the marrow itself or its investing pia mater. I thought I could detect a very faint odour of the acid in the brain, but I was not perfectly sure of it.

No. 14.—Death speedy. Brain and spinal marrow, with membranes, natural; not particularly injected.

In all the dogs that I examined the stomach was found to be very much contracted, the mucous membrane excessively corrugated, and of a brownish reddish colour.

These examinations having furnished so little information of a positive character, I determined to open the bodies of many animals destroyed under various circumstances, and examined at different periods after the acid had been given. For the result, in by far the greater number of instances, I must refer to the accounts of the experiments themselves, to which I have added them; in order to save space and to avoid, as far as possible,

unnecessary repetition, I here place the details of only a few of the examinations.

No. 86.—Rabbit: poisoned in two minutes and a-half, by respiring the vapour of hydrocyanic acid. Examined five minutes after it had ceased to breathe. Heart: some little clear serum in the pericardium, also in the cavities of the pleuræ. This was evidently just being effused, as on the pericardium being opened and the serum wiped away, the surface of the heart was soon again moistened by the exuding fluid. The left ventricle contracted and firm, the right ventricle filled, but not distended, with blood; the two auricles excessively distended, as were the coronary veins, the three venæ cavæ (the rabbit has two descending cavæ,) and the pulmonary arteries and veins; the aorta and its branches were empty; the lungs were reddish in colour from the blood they contained; the two auricles and right ventricle contracted rapidly, but, apparently, without the power to propel their contents. Blood uniform in colour, darker than natural and muddy in appearance. Brain not in the least injected, indeed, it might be called pale in colour; neither its membranes nor sinuses were filled; spinal marrow itself natural, not injected, nor was the spinal pia mater, but the vertebral sinuses, from top to bottom, were enormously distended with almost black fluid blood. During the time the brain and spinal marrow were examined the heart continued to pulsate. I cut through the cervical portion without effect, then cut out the whole dorsal and part of the cervical without effect, then cut away the whole brain and remaining part of the cervical spinal marrow, the heart still pulsating, and not being in the least influenced by the interference with the cerebro-spinal axis. The pulsation of the heart had not entirely ceased until an hour and a-half after the animal had been placed in the vapour, eighty minutes after the heart had been exposed, and sixty minutes after the brain and spinal marrow had been removed; first the left auricle ceased, then the right ventricle, and lastly the right auricle.

The examination of the kitten presented analogous appearances. There was serum effused into the pericardium and pleuræ; the lungs were reddish from the blood they contained; the right ventricle and the two auricles, with the coronary veins, were distended, but not to the same extent as in the rabbit, and the left

ventricle contained some little blood; it, as well as the three other cavities, continued to contract, or rather to move; the aorta was not perfectly empty. Brain and its membranes not injected; in fact, the substance of the brain was white; spinal marrow natural; the dorsal sinuses, through the whole extent of the vertebral canal, filled with dark fluid blood, but not to the same extent as in the rabbit; entire brain and spinal marrow removed in the same manner as in the rabbit, with the same want of effect upon the action of the heart. It was not until at least six hours had elapsed after the whole cerebro-spinal axis had been taken away, and more than six hours and a half after it had breathed, that all the cavities of the heart ceased to move. This they did in the usual order, the left ventricle soon being empty, contracted and quiescent, the right auricle continuing to move the longest.

Though the heart in pulsating does not appear to propel the blood, yet the cavities gradually become less, the blood probably being forced out by the tonic rigidity which supervenes; so that although its motions become more feeble, until some extraneous stimulus, as a sharp prick, is required to excite them, by the time they have altogether ceased the heart is generally empty, very small in size, and hard from its contracted state. This is a condition which I have observed in nearly every animal examined while the heart has been acting.

No. 87.—Rabbit: died from the inhalation of the vapour of the acid and of sulphuric æther. Opened three minutes after it ceased to breathe. Heart, acting strongly; appearance of heart, blood vessels, and lungs, exactly as in the preceding rabbit, with the same effusion of serum going on. Head and vertebral column not disturbed, in order to compare the heart's action with the preceding. Heart ceased to act in less than three hours; the ventricles, at least, an hour and a-half before the auricles; these continued nearly filled with blood, which on the following morning was found to be partially coagulated. The ventricles also contained a small quantity of blood; altogether the heart was not contracted so firmly or completely as in the preceding case, or as is usually found.

Kitten: death induced as the last. Chest opened four minutes after it had ceased to breathe; the appearances were exactly as in the preceding kitten. Head and back not disturbed; the heart

continued to contract for upwards of three hours, the auricles being very active; contrary to what I have almost uniformly seen, the left continued to act vigorously, probably from its containing blood. The following morning they still contained blood, alike in colour and fluidity, while the ventricles, especially the left, contained hardly any.

No. 89.*—Chest opened in four minutes after acid had been given. Heart beating; all the cavities contain blood, as do the venæ cavæ, all the pulmonary vessels, and the aorta, but none of them are much distended; the left cavities are much less so than the right, and the aorta than the pulmonary vessels; the blood is of a *bright florid* colour; the lungs are collapsed and of a pink colour; the whole extent of brain and spinal marrow laid completely bare in sixteen minutes; entire mass of brain removed at seventeen minutes; heart pulsating as before; whole spinal marrow removed at eighteen minutes; heart continued to beat, but not quite so vigorously, as when the chest was first opened; the left ventricle has ceased to contract and has become nearly empty, while the distention of the right has somewhat increased; the left auricle has lessened, the right is of much the same size; the auricles do not contract together, the left contracting twice to the right once, then being perfectly still, while the right auricle and ventricle continued to contract, but in no regular order, sometimes the auricle two or three times without the ventricle, then this two or three times without the auricle; forty-seven minutes, the heart is now still, but on pricking it, the left ventricle and the right ventricle and auricle show the slightest motion; there is also some little motion in the intestines; fifty minutes, all motion of the heart has ceased; the left ventricle is firmly contracted and empty, the auricle nearly so, but not quite; the right auricle is full, but not distended, the ventricle not quite so full as before, and perfectly flaccid; twenty-four hours, the heart is firm, small, and pale, *all* the cavities being perfectly empty.

No. 89.**—Chest opened in twenty-three minutes after the acid had been given. Blood rather darker than in the preceding case. Condition of the heart similar, except that the right cavities are more distended, the left ventricle more contracted, and the aorta empty. Lungs pink in colour, contain frothy mucus, and are not quite so much collapsed as in the last. Fifty minutes, even on

irritating the left side of the heart, neither the auricle nor ventricle contract, but both the right, especially the ventricle, continue to contract rapidly, though feebly; one hour and a-half, on irritating, both still show very slight movement; four hours and a-half, about the same amount of motion; ten hours, on pricking suddenly, the ventricle shows the merest movement possible.

No. 142.—Half-grown kitten. Attempted to give thirty minims of acid, so as to destroy it, if possible, instantly: not nearly the whole got into the mouth, and but little of that swallowed; held in the hand by the four legs; struggled, but not violently, for nearly a minute; cried out, passed water, but not fæces, then motionless. Heart exposed in less than two minutes, beating; left auricle and ventricle contracted and empty; the right ventricle and auricle contained some little blood, but were by no means distended; pulsation did not expel any portion of it; aorta empty; the venæ cavæ tolerably full, but not distended; lungs collapsed and white, not in the least engorged; the ventricles soon ceased to contract, but the auricles, more particularly the right, continued to contract for nearly half an hour; the right ventricle was now nearly empty and quite flaccid; the left ventricle became quite dense and rigidly contracted, even while the right was perfectly soft and loose; this, however, gradually contracted, but was not perfectly so until the expiration of nearly three hours. Twenty-four hours after, the heart quite firmly contracted and dense; on cutting open the cavities, about two drops of blood were found in the right auricle; the other cavities perfectly empty; indeed, from the contraction, there were no cavities.

No. 143. Kitten, fellow to the preceding. Gave thirty minims of acid; the whole swallowed: convulsed, cried out feebly, passed a little urine; insensible in fifteen seconds. Chest opened in forty-five seconds. Blood natural in colour. Lungs white, and instantly much collapsed; the large blood vessels not much distended. Heart, feebly pulsating. Left ventricle and auricle empty and contracted, but not very firmly; right auricle and ventricle contained some blood, but not distended. The left side of the heart soon became motionless; the right ventricle showed some fluttering for five minutes, and the right auricle continued in motion for twenty-three minutes; the motion, however, was of such a character as not to propel the contained blood. During this time the right cavities gradually became fuller, and were now distended, but not

excessively so; the venæ cavæ were also rather full. It was not until nearly an hour had elapsed before the left ventricle had become completely contracted; the blood in the right side separated into two portions, a colourless and coloured, but still was not coagulated. Thirteen hours after, the right side of heart is rather less than it was, but still contains blood, and is flaccid; the superior cava opened, the blood in coloured and colourless portions immediately escaped, emptying the heart, the motion of the blood rendering it of one uniform colour.

Blood.—The condition of the blood would naturally excite considerable attention; an attentive examination of it, however, does not yield any very positive results. The appearance of the blood to the naked eye is often materially changed, not only in colour, but it looks muddy and broken down, while its important property of coagulation is so interfered with that it seems to be the generally received opinion, that after death from hydrocyanic acid the blood is almost invariably found in a fluid state: yet this is by no means the case; and unless other observers shall be more successful than myself, the examination of the blood will throw but very little light upon the subject. If, however, any inference is to be drawn, it will tend to confirm the opinion that the action of the acid is upon the central nervous mass, the blood being only secondarily involved. Though the blood to the naked eye is often materially changed in appearance, yet when examined under the microscope no decided difference is seen between the globules of blood drawn from an animal before the administration of the acid and that taken immediately after death has ensued from it, whether the acid has been given by the stomach, or through the lungs by inhalation.* Experiment 141 *bis* shows that even the almost daily

* I would here recommend any experimenter upon the effects of substances upon the blood, first to examine the healthy blood of either the same or a corresponding animal, or he may be led into a mistake similar to the one I was nearly committing. I first examined the blood of a kitten poisoned by the acid, in which the globules were seen of the most irregular shapes, or, rather, regular in irregularity, for the greater number approached a hexahedral or octahedral form, with a few larger flattened circular discs among them. This would have been supposed an effect of the acid had we not examined the healthy blood, which was found to present exactly the same appearances. The addition of a minute portion of water, or hydrocyanic acid, instantly converted the irregular granules into circular globules. The irregularity in the shape of the globules of the young kitten has not, I think, been mentioned by

saturation of the system for the space of fourteen days with the acid does not change the character of the globules; and that the acid has, in reality, no peculiar action upon the globules is shown by the fact that when it is added to healthy blood just drawn, on examination it is found not to produce so great an effect as a similar quantity of water does; indeed, the globules remain tolerably perfect and in motion for a considerable period, the appearance of the clear central nucleus gradually becoming more distinct. It might, therefore, be supposed that the action of the acid was limited to the fibrine, yet it is extremely doubtful if there be any decided change in even the fibrine, for the foregoing observations by no means confirm the idea of the fluidity of the blood after death from hydrocyanic acid; on the contrary, in by far the great majority of cases the blood is found to coagulate, though by no means invariably so; possibly coagulation is somewhat delayed, and certainly in many instances the coagulum is found less dense than in blood abstracted from the body. But it must be borne in mind that after death from almost any cause, the coagulation of the blood in the vessels is hardly ever complete, and often very imperfect, as compared with that which possibly has been abstracted from the same body only a few hours before death. In order more certainly to test the effect of the acid upon the fibrine as the blood was flowing from the arm of a woman, bled on account of an inflamed leg, into one cup I had six minims of acid added while the blood was flowing: the only difference observed between this cup of blood and a corresponding one without the acid, was that it was thought the blood in the cup which contained the acid coagulated somewhat more slowly, but that the coagulation after a short time was more complete, and the clot more dense than in the other.

So, also, though the colour of the blood is very frequently darker than natural it is not always, as several of the experiments show. Thus in No. 112, where out of four toads which were destroyed in a similar manner, in two the blood was florid, while in only one was it very dark; and in the cats, Nos. 89 and 98, the blood was of the brightest, most florid, hue I ever saw any arterial blood,

microscopists as greater than in other young animals. I am indebted to my friend, Mr. W. S. Ward, for the use of his microscope in these experiments, and also in some of the examinations of the blood for his personal assistance.

and the blood which flowed from the jugular vein of the dogs, experiments 80 and 81, was certainly not darker than usual.

These experiments sufficiently prove that in whatever way hydrocyanic acid acts it affects the whole animal kingdom (if not the vegetable also,) in a similar manner.* Some animals, it is true, are more obnoxious to its influence than others, but even in this respect the difference is not nearly so greatly so great as has been supposed. Those who have imagined that reptiles, amphibia, and the cold-blooded animals generally, enjoy an almost perfect immunity from its deadly properties, have been deceived. True it is that these creatures do require a larger quantity than warm-blooded animals to affect them, but the difference in the time required for the development of the symptoms is far greater than that of the quantity, it being often several minutes before any symptom whatever is manifested. Experiment 107 will show that considerable power may be retained for a long period, and, in one instance, I saw a frog, which subsequently died, leap a foot in length at least half an hour after the acid had been given. Whether the larger quantity which may be taken and the longer time required for its manifestation bears any ratio to the slowness of the circulation, or the different condition of the nervous system, it is difficult to say positively. Those who suppose the acid to act by being absorbed into the blood would incline to the former opinion, and, perhaps, consider the question proved by the well established fact of the absorption of the acid, for not only may its presence in the blood be detected chemically, but it is exhaled from the lungs in respiration within a short time after it has been swallowed, or, even, as in experiment 22, after it has been placed within the rectum. Those, again, who lean to the supposition of the difference being dependent upon the condition of the cerebro-spinal axis and the nerves, would point to the curious fact of the acid, whether it be introduced into the blood by absorption from within the living body, or merely by adding to it when abstracted, producing no greater effect if so great in its physiological properties than a

* If the effects of hydrocyanic acid upon plants be, as the experiments seem to show, similar to its effects upon animals, it would prove either that plants possess a structure analogous to the nervous of animals, or that in these the acid does not primarily act upon the nerves, or so acting that its specific and essential action is proximately upon some parts whose structure and functions are common to plants and animals.

similar quantity of water does, and also to the fact of some warm-blooded animals, where there is no corresponding difference in the condition of the circulation, being more obnoxious to the poison than others; thus the rabbit and the mouse (perhaps all rodents,) are more susceptible to its action than is the cat, and the young animal of the same species than the old, while in these the tenacity of life and the powers of the nervous system are more equable and enduring than in the young.

When the effects produced by a dose of hydrocyanic acid are not too rapid to be observed, the earliest appear to be giddiness, with a loss of muscular power and control over the combined action of the muscles; the head droops, the mouth is open, the tongue protrudes, there is apparently a sense of distress and constriction in the fauces, and the respiration is hurried and panting; but I doubt whether this condition of breathing is not dependent upon the state of the muscles. It would seem they are unable to expand the chest deeply, gradually, and efficiently. The muscles of the pharynx and larynx are very soon affected, and, indeed, it might almost be supposed that these are peculiarly susceptible to to the action of hydrocyanic acid. There are many persons who are unable to detect the presence of the acid by the sense of smell, yet who are at once cognizant of it by a peculiar feeling of dryness, and the sensation of constriction, in the throat; and even those persons who detect it readily enough by the nose are also conscious of this feeling. When any one has been exposed for some time to the vapour of the acid, even when not very concentrated, this feeling in the throat continues for some hours. Thus in the case of Mr. A———, which is reported in the *Provincial Medical and Surgical Journal* for July 23rd and 30th, 1845, with whom I remained upwards of half an hour before he died, and shortly afterwards made an examination of the body, I did not altogether lose the feeling until the next day. The true explanation, however, of this is probably, not that these parts are really more susceptible to the action of the acid than the others, but that in the act of respiration it is brought immediately into contact with them.

This unsteadiness and loss of power is speedily succeeded by spasm,—frequently of the most intense kind. This may be either tonic or clonic, according to the strength of the dose of acid and the

susceptibility of the animal. The stronger the dose usually the more violent and continuous is the spasm. If the spasm be tonic, not only do the voluntary muscles continue rigid, but the heart is, at least, to the same extent, affected. It ceases to pulsate, the diastolic action is suspended, and consequently the circulation is at once arrested, while the respiration is also equally, and at the same instant, prevented by spasm of all the muscles by which the function is performed.* Hence, the lividity and bloatedness of the face; the protrusion of the eyes; and the excessive congestion of the veins. In this condition of these two all-important functions is to be seen one of the causes of the almost instantaneous death which takes place in some instances.

When, however, the dose of the acid is less, or the susceptibility of the animal not so great, the rigidity of the muscles soon abates and gives way, and is followed by paralysis more or less complete; when the respiration either becomes excessively rapid, the chest being but little expanded, or it is very slowly performed, being then deep and sighing. The heart now beats most rapidly and feebly.

This state of paralysis may continue, the weakness gradually increasing until the animal dies, or, as more generally occurs, the creature is convulsed and paralyzed at intervals, the heart continuing to beat very feebly for two or even three minutes after all indication of sensation and other motion have ceased; though by no means unfrequently a strong convulsion immediately precedes death. In some instances I have observed respiration continue quite as long as the heart could be felt to pulsate. If the animal recovers it will often lie in the most complete state of paralysis possible; after a time some little convulsive movement in the limbs, or some spasmodic action in respiration may be observed. These gradually become stronger, until the convulsions often become very powerful. It now howls loudly, reflex action returns,

* It is in these cases that the foaming of the mouth, which has been much dwelt upon as a symptom of poisoning by hydrocyanic acid, most occurs. It is, however, by no means an invariable symptom; when the trismus is considerable, the foaming is seen; not otherwise. When the tongue protrudes, it often appears to possess a sort of vermicular motion, which, on closely observing, is seen to arise from a very rapid series of contractions and relaxations of its muscular fasciculi. On laying the hand upon the trunk or limbs of the animal, the same quivering is felt to pervade all the muscles.

and, after a time, sensation. The utter powerlessness of the creature gradually becomes less, and sensibility is evinced. It will now sit or lie as though in a comfortable sleep, and, after a varying period, will either wake up and appear surprised and walk slowly away, or it will continue very feeble, but little disposed to move, and with very little command over its muscles.

I do not agree in the opinion which has been expressed by some,* that the heart only ceases to beat because of the suspension of respiration, and its consequently containing only dark blood. It rather appears to me that the cause of death is altogether different from what occurs in asphyxia from occlusion of the air passages, the heart being primarily, and to, at least, an equal extent, affected as respiration.† This is not merely a theoretical question, but a most important practical one, as it must materially influence the treatment. If the heart's action only ceases on account of the want of respiration, and the consequent engorgement of its cavities with dark blood, venæsection would be one of the remedies to which we should first have recourse, and from which we should expect the most decided benefit; while, on the contrary, if the state of things be as I suppose,—not only that the blood itself is changed by the introduction of the poison, but that the heart is primarily affected, our reasons for having recourse to venæsection would be much less powerful; neither should we expect the same amount of benefit from its employment. The results of experiments 79, 80, and 81 do not justify the expectation of any very marked benefit from the abstraction of blood, for though there is experiment 54, in which the dog recovered after having had an emetic and being bled, I do not attribute this to the abstraction of blood, but rather to the small dose of acid in proportion to the size, age, and breed of the dog; I am inclined to think the result would have been the same had blood not been taken. Besides this, it was an artery which I opened; this would, of course, relieve the left side of the heart, and consequently could have little influence in indueing a continuance of its action, according to the theory of those who think the heart only ceases to act on account of the

* Dr. Lonsdale; *Edinburgh Medical and Surgical Journal*, vol. 51, p. 56.

† The appearance of the heart is altogether different from what occurs in asphyxia from drowning, as shown in the heart of a frog, a toad, and two kittens, which were examined immediately after death, by immersion, at the time these experiments were being made.

distention of its cavities from impediment to the passage of the blood through the lungs. If this were so, it would be the right side of the heart, not the left, which would principally be engorged, and which should be relieved by venæsection. If the bleeding in this case were really useful, it would tend to support the view I have above taken of the condition of the heart.

It must not be understood that I am arguing against the abstraction of blood in every case, or denying that congestion does occur. Under all circumstances when the respiration and circulation are feeble, and more especially in similar cases to those under consideration, where there is also spasm, congestion is apt to take place. Venæsection may, therefore, in some few cases, where the dose of acid has been small, be proper and advisable enough, when practiced with the understanding of why we employ it, and too much blood be not abstracted,* but as there is great loss of power as well as spasm at the time, and where recovery takes place considerable weakness and depression are for a while manifested, the taking away a large quantity of blood, in my opinion, is likely to be rather injurious than beneficial. The condition of the heart, at least at first, is one of contraction, not of dilatation. There is a persistance of contraction, not a diminution of contractibility, so long as the spasm continues, and of the left cavities for long after. The cavities, it is true, may possibly occasionally afterwards become engorged, but this is only when the heart, like the general muscular system, becomes paralyzed, and certainly is not supported by the condition of things as revealed by the post-mortem examinations above recorded.

Though the sensorium is soon affected, as shown by the vertigo, which is one of the earliest symptoms, it is not that portion of the cerebro-spinal axis which appears to be most affected by hydrocyanic acid. At the time I was with Mr. A——— I could not divest myself of the feeling that he retained some degree of consciousness, and was to some extent cognizant, at least in part, of what was going on about him (and even at first, when I shouted in his ear, that he recognized my voice,) at a time when he was

* Of this, in most cases, there is little danger, as the blood will not flow. Indeed, I am not sure the distress in respiration is not in a great measure caused by the want of blood passing through the lungs. It appears very probable that but very little blood is passed forward by the heart.

unable to give much indication of sensibility. From what I have since seen in many of the animals I have experimented upon, I have little doubt they retain some consciousness and sensibility when, from the powerlessness of the muscles, they are unable to indicate it. Of course when the powerlessness is complete it cannot be proved that either, in any feeble degree, is retained; but it may fairly be inferred from what is witnessed in such cases as Nos. 11, 23, 28, 33, 36, 39, 88, 90, 91, and others, that the acid acts more upon the nerves of motion than upon those of sensation. To what extent consciousness is retained it is difficult to say; I am, however, inclined to think it is preserved to a longer period than many are even now disposed to allow. The many cases which have been reported where parties have swallowed large doses of hydrocyanic acid, and yet retained consciousness for some time, proves that it may be retained longer than was formerly supposed to be possible; but, even in these, consciousness is thought to be retained only so long as the power of voluntary motion continues; it, however, appears probable in some cases, where either the dose has not been sufficiently large to prove suddenly fatal, or the susceptibility of the animal to its action but little, that some degree of consciousness may be retained, after all power of voluntary motion is lost, and even when there is but little sensibility remaining; at least, some of the foregoing experiments seem to indicate this. If this be correct, it would prove that the sensorium is not that part of the nervous system which is most affected by hydrocyanic acid, so also the violent spasmodic action, occurring alternately with paralysis, independent of volition, would point rather to the spinal marrow than to the brain as being most obnoxious to the action of the poison.

Whatever may be thought of this opinion, there are few persons, I apprehend, who will be inclined to dispute that upon one most important practical question these experiments are quite decisive, and fully confirm the reports which have been made of the length of time which not only consciousness, but perfect volition and entire control over voluntary motion, may be retained after a dose of hydrocyanic acid, sufficiently large to prove fatal within a few minutes, has been taken. In some few instances, as Nos. 8, 9, 15, 18, 27, and 36, the action of the poison was so expeditious as to prevent almost the slightest exhibition of voluntary motion;

but in the majority of dogs and other warm-blooded animals, about twenty seconds elapsed before any symptoms were manifested; and this space of time in a man would allow of several actions being done, as the corking of a bottle and placing it in the pocket, or upon a shelf, the possibility of which has been much doubted. In several of the dogs a much larger interval intervened, during which they gave no indication of having had hydrocyanic acid; thus the time which elapsed before any decided symptoms of poisoning were shown in Nos. 4, 6, 13, 14, 70, was fully sufficient to have permitted a man to have performed many voluntary actions, and to have not only put away anything which would have revealed the nature of what he had taken, or how he had taken it, but also to have passed to a considerable distance from the place where he had swallowed the poison: while a still more remarkable retention of consciousness and power was seen in 24, which went down three or four steps of some stairs, saw the door at the bottom was closed, and came back again; in 56, which went down, came up, and then went down again, the whole flight a steep winding staircase; and in 38, which retained sufficient vigour to jump over one of the dogs, and then actually leaped completely across the open top of the staircase. In No. 22, to which the acid was given by the rectum, fully two minutes elapsed before symptoms set in, and it was not until a further period that voluntary motion was lost, yet the animal died in thirty-seven minutes; while in a few, but only a few instances, as No. 60, where the effect was almost immediate, yet the dose was not sufficient to destroy life.

Reflex action is that which is last destroyed and first returns. This continues for some time after all voluntary motion and sensation have ceased. Touching the cornea will induce winking of the eye-lids when there is nothing to indicate the retention of volition or sensation, and irritating the nostrils of a frog will cause depression of the eye.

When the dose of acid has been sufficient speedily to destroy life, none but an ignorant or careless person would confound the effects with those produced by opium; but if the animal survives for some time it is very different. The deep, quiet sleep, with the great indisposition to be roused from it, so closely resemble those from opium, while the condition of the pupil is so variable, being

often in this stage by no means dilated, that not only is there great liability for the effects produced by the acid to be confounded with those of opium, but I have very strong suspicions that in, at least, one recent case where death was supposed to have been induced by opium, it, in reality, was caused by hydrocyanic acid. Experiments 56, 88, 90, 91, and 141 *bis*, will show the symptoms which most resemble those seen after opium.

The acid acts locally as well as generally. This is seen not merely by its producing vascular congestion, but also by the decided effects upon the nerves of the part. Thus when it is dropped in one eye of an animal, the pupil of the eye is sooner, and to a greater extent, dilated than that of the other; and when the acid is administered by the rectum or the vagina, both hind legs are sooner affected than the anterior portion of the body. (See experiments 19, 22, and 23.) But that the acid does not directly paralyze muscular fibres, when locally applied, is shown in the experiment upon the frog, No. 108, where a drop of acid, applied upon the heart itself, acted as a stimulant, inducing a quickened action; possibly any other fluid would have done the same; had, however, the acid been a direct sedative, such an effect would not have continued for so long a time, and, perhaps, more decidedly still in the cat, No. 96, where three drops were put upon the heart without arresting its motion.

Post-mortem examinations, whether made immediately after life has ceased, or not until some time afterwards, do not throw any very decided light upon the cause of death; indeed, until I had examined the state of the heart immediately the acid had produced insensibility, I had, like other observers, considered the evidence as altogether of a negative character; for the reports of the appearances found in examinations made some time after death of the bodies of men and animals who had died from the effects of hydrocyanic acid are too contradictory to be at all conclusive. Such, also, I found to be the case with the animals I examined a day or two after death; but, if the body be opened while the heart is pulsating, this contradiction in the reported condition of the heart and great vessels is in a great degree explained. If death has been long delayed, or the dose of acid very small, the blood is usually dark in colour, alike on both sides of the heart, and all the cavities of the viscus may contain more or less blood, especially

the right, which is often much distended; while, on the contrary, if the death has been sudden, in almost every case the left side of the heart, and especially the ventricle, is found to be perfectly empty and rigidly contracted, while the right side of the heart contains blood, being in some cases, though by no means always, much distended. That this different condition of the two sides of the heart does not depend merely upon obstruction to the flow of the blood through the lungs is shown by many of the post-mortem examinations, but I would refer particularly to those of the two rabbits and two kittens, Nos. 86 and 87, where not only the right side of the heart, venæ cavæ, and the pulmonary arteries were filled, but also the pulmonary veins and left auricle, while the left ventricle and aorta were contracted and empty. This, when taken in conjunction with the appearances found in the two kittens so suddenly destroyed and immediately opened, Nos. 142 and 143, where not only the left ventricle was empty and the auricle on the same side also, but the lungs were white and collapsed, their blood vessels not filled, and the right cavities by no means distended with blood, proves, beyond a doubt, that this condition of the heart is dependent upon causes acting upon itself, and that it does not merely depend upon any change in the respiratory function.* In nearly every instance the aorta and its large branches were, like the left ventricle, found empty. That the large arteries are, after death from most causes, found to contain but little blood I am aware, but I do not think there is ordinarily such a bloodless and contracted condition.† It would seem as though not only the left ventricle propelled the whole of its blood, and continued in

* It must not be forgotten that we know hardly anything of what is or would be the condition of the heart and great vessels, if examined so immediately after death has occurred in a healthy animal from any other equally sudden cause.

† This condition of the heart and great vessels sufficiently explains, what has given rise to much surprise, why it is that with the venous system so much congested, so little blood should flow on a vein being opened. It is obvious that it cannot. The circulation is positively suspended; though there be motion of the heart, the blood is not propelled; there is no *vis a tergo*. For as the left ventricle will not open to receive the blood from behind, so it cannot give the onward impetus: hence, should the blood in some degree flow, or afterwards continue to drain away, this will merely depend upon the circumstance of the aperture being in the most depending position, when, if the blood continues fluid, some of it will find an exit, as any other fluid does from an opening below its level, a mode of escape altogether different from that in ordinary free venæsection.

persistent contraction, but that if the contractile power of the great arteries be not absolutely increased, by the diminution of opposing force, it is relatively so. I am not, however, convinced (but, on the contrary, rather incline to the opinion,) that if the contractile power of the involuntary muscles be not increased, at least the persistence of it may yet be. The movements of the alimentary canal, throughout its entire extent, are not only most decided, but long continued, and afford by far the best opportunities I have had of observing the peristaltic action of the intestines, and the important use of the mesentery in preventing entanglement and intussusception of the gut. So strong are the motions of the different portions of intestine, that the attached mesentery is put fully upon the stretch. The passing of urine and fæces so often witnessed during the action of the poison, would not of itself be regarded as of much importance in this argument, as it might arise from paralysis of the sphincters, but when it is considered that it usually takes place during the time of rigidity, and that not unfrequently there is considerable straining to pass both fæces and urine, with protrusion of the rectum and, at times, of the penis, in connection with other circumstances, it is worth bearing in mind.

The curious fact of the independent action of the different cavities, and even of different portions of the same cavity, of the heart, as well as the curious order in which their contractibility disappears, the right auricle apparently possessing the greatest persistence of action, so frequently alluded to in the post-mortem examinations, and especially the property which experiment 88 and others, upon the rabbit and kittens, fully prove the heart to possess of continuing for long to contract after the brain and spinal marrow are entirely removed, even in warm-blooded animals, also supports this view. I would venture here merely to refer the reader to the detail of these experiments: the facts could not be passed over in this account of the action of hydrocyanic acid without being alluded to, but to follow them out would lead us too far away from the subject immediately under consideration, and their physiological bearing is far too important not to demand a full investigation, the result of which I must elsewhere relate. I may, however, state that while I do not consider them as proving the truth of the Hallerian hypothesis of the independence of muscular contractility

of the brain and spinal marrow, (for the determination of which a far more extended series of experiments must be made,) they are, at least to my mind, fully sufficient to disprove the opinion of Flourens as to the dependence of the heart's action solely upon respiration, inasmuch as in these experiments, and many others, the whole anterior thoracic parietes had been removed, and, consequently, no respiratory movement could take place. They not only appear decisive as to the incorrectness of the statements of Le Gallois, for the entire mass of the brain and spinal marrow was removed, but they also strongly tend to show, that whatever countenance may be given by them to the conclusions of Wilson Phillip, they at any rate prove that the sudden taking away of the brain and spinal marrow does not, as he supposed, at least under all the circumstances, arrest the action of the heart; and further, if it be admitted that these parts are under the dominion of the sympathetic nerve, not possessing an independent inherent power of contractility, the experiments would, at any rate, prove, first, that the office of the sympathetic nerve is not merely to bring those parts to which it is distributed under the influence of the motor power of the cerebro-spinal axis, but that it in reality is an independent nervous system, being only connected with the spinal marrow, and not derived from it; secondly, that as its functions are different, so is it differently affected by the same means, for while the power of the cerebro-spinal system is utterly destroyed by the action of hydrocyanic acid, that of the sympathetic is scarcely or not at all affected by it.

An appearance which I have almost invariably found present is the congested condition of the membrane upon which the acid is applied: thus the stomach is found when empty to be much contracted, and the mucous membrane of a brick-red colour. The same appearance of congestion is seen in the vagina, the rectum, and conjunctiva, when death has followed the application of the acid to these parts. I have thought the lungs were found to present a collapsed condition when the poison has been swallowed, but when inhaled the lungs are frequently, though not invariably, much congested, scarlet in colour, and in an emphysematous condition from distention of the air-cells. The examinations will show that we may in vain look for any decided change in the substance of the brain and spinal marrow. At first, when

the examinations had been limited to dogs, and those principally which had been dead some short time, I was inclined to think the little congestion of their membranes was a post-mortem effect, depending upon the position of the animal and the fluidity of the blood. I had not then observed that in nearly every instance the vertebral sinuses are remarkably engorged. On finding this in almost every case, even on immediately opening the canal, for some time I thought this was to be regarded as something positive and explaining, or, at least, connected with, the state of the spinal marrow and the excessive convulsions, but more numerous examinations lead me to doubt if the distended condition of the vertebral sinuses arises from anything more than the general distention of the veins throughout most of the body, for I have observed the two exist in the same degree in the same cases. If the convulsion have been tonic, the vertebral sinuses and veins generally are much distended; on the contrary, if the convulsion be less, there is less venous distention, though it is never altogether absent. It at first seems singular that the vertebral sinuses should be almost uniformly so much engorged, while the cerebral are not; but this, perhaps, admits of explanation by the fact of the vertebral sinuses being rather the receptacle for the blood which has circulated in the surrounding parts, than in the medulla itself, while with the cerebral sinuses it is just the reverse. Hence, probably, the circulation in the spinal marrow is in reality not more disturbed than it is in the brain, for if it were, we should find the congestion in the veins accompanying the spinal arteries, instead of in the vertebral sinuses, which we do not. We must, therefore, conclude that the symptoms exhibited depend upon some functional perversion in the action of the nervous system, or upon some physical change, which either disappears with life, or is of so slight and subtle a character as hitherto to have escaped detection, being confined to the more minute organization; or, on the other hand, we must consider the persistent contraction of the left ventricle of the heart as a primary effect of the acid, the suspension and perversion of the cerebral and spinal functions being secondary and dependent on the want of a due supply of arterial blood, and, possibly, on the congested condition of their veins.

In the case in the *Provincial Medical and Surgical Journal* before referred to, it is stated that the acid was easily detected in the

contents of the stomach twenty-three days after death, although no pains had been taken to preserve it. This appeared to be in direct contradiction to the general opinion as to the speedy disappearance of the acid. From what I have since seen I do not now doubt that the preservation of the acid for so long a period was owing to the contents of the stomach having been removed from the viscus, and to their being strongly imbued with gastric juice, the antisceptic properties of which were sufficient to preserve the whole mass from decomposition. The examination of the animals now reported does not confirm the supposition that, under ordinary circumstances, hydrocyanic acid can be found many days after death, even when the body has not been disturbed.* If decomposition is not accelerated, it is certainly not delayed; and when this has advanced to any extent, it is probable the acid will have participated in the change. I am inclined to think the rigidity after death from hydrocyanic acid is greater than after death from some other causes. I may also mention that animals poisoned by the acid may be eaten by others. The trout, killed by six minims of acid, was eaten the same night by a cat without any ill effects; so also were some of the rabbits, and others were blown by flies, the maggots of which feasted most luxuriantly upon them.

There is no fixed quantity of acid which will invariably destroy life. The boundary between the dose which is hazardous, or even will destroy life, and that which may be taken with impunity, is very slight and indefinite,—dependant upon individual, and, probably, varying circumstances. The same creature is, I apprehend, liable to be seriously affected by a dose which at another time would produce but little effect. This, indeed, appears to be fully proved by the varying effects produced upon the cat, No. 141 *bis*, by exactly the same doses of acid. The more vigorous the animal cæteris paribus, the larger is the quantity which may be taken. The stomach being full of food lessens the effect of the acid, probably by its mixing with the acid, and thus preventing the poison coming into such ready contact with the mucous membrane. At this period there is also more vigour in the system, whereas an empty stomach allows the immediate contact of all the acid at once, and a hungry animal possesses less power of resistance. It was owing to the stomach being nearly filled with food recently

* In scarcely a single case could I detect the smell of hydrocyanic acid in the brain.

taken at breakfast, that, I think, may fairly, at least in part, be attributed the long continuance of life after the swallowing of so large a quantity of hydrocyanic acid as there is every reason to suppose was taken by the person whose case is reported in the *Provincial Medical and Surgical Journal* for July 23, 1845. The age of the animal, I am quite satisfied, makes a material difference.* The foregoing experiments, I think, fully prove that a much smaller dose of the acid is fatal in young animals than in old; and that almost in direct proportion to the youth of the creature is it speedily and fatally brought under the influence of a smaller dose of the acid. Several of the experiments would, however, show, as Nos. 87,* 87,** 90, and 91, that this must be taken with some limitation, for it would appear that the *very* young animal is actually less suseeptible, and requires a larger dose of the acid to destroy it, than does one of the same species a little older. This is so curious a fact, that were there not sufficient evidence to support it, we should feel much inclined to doubt it. Is it to be regarded as another proof of the approximation of the young of the higher species to the adult of the lower?

The degree of concentration of the acid has no very material influence over its action. The dogs to whom a diluted acid was given were quite as speedily and violently affected as those to whom acid of Scheele's strength was administered. Indeed, I am inclined to think, from observing the action of the concentrated acid, containing twenty-five per cent. of real acid, that a moderate degree of dilution renders the action of the acid more speedy, probably from bringing it at the same instant into contact with a larger surface. Certainly the foregoing experiments shew that dilution to a considerable extent does not weaken the action, if it does not rather accelerate it. The contrast between experiments 11 and 35 would by many seem to prove greater effect and rapidity in the very dilute acid; it must, however, be borne in mind that No. 11 was an adult dog, while No. 35 was a young one.

* It will be observed that I have for the most part mentioned the breed and age of the dog. The old can certainly bear much more than the young, the strong and active than the feeble, and some animals, when every circumstance appears to be as nearly as possible the same, have a greater power of resistance than others. I am not quite certain that the weather does not make some difference in the power of resisting the acid: in very hot weather I suspect it is somewhat less; probably on account of the debilitating effect it has upon the creature.

The action of the acid is not proportionably speedy to the quantity taken. The difference between the rapidity in the effects of a large dose of the acid and of one which is so small as to be barely sufficient to destroy life, is certainly well marked; but this is not the case between two doses each of which is capable of destroying life with moderate rapidity;—as for instance, suppose forty minims of Scheele's acid will kill a dog within four minutes, it does not follow that eighty minims or two drachms would do so in two minutes, or in one. Hence, when called to a person poisoned by hydrocyanic acid, we cannot, merely from the length of time he has survived, or the violence of the symptoms, determine anything with certainty as to the degree of concentration or dilution of the acid, nor, except within wide limits, much as to the absolute quantity taken.

In determining whether hydrocyanic acid possesses an accumulative power or not, it is necessary first to determine what we understand by this. The foregoing experiments clearly show that where one dose has not been sufficient to destroy life, a second smaller one, which, by itself, would not have been sufficient to kill, if given before the effects of the first have passed away, immediately induces more violent symptoms, and that death speedily ensues. Thus, within certain limits, hydrocyanic acid may be said to be accumulative, but in this sense almost every medicinal preparation is the same. But if it be meant by those who imagine that the acid is accumulative, that doses of it given on different days may be so small as singly to produce no injurious effects, and might otherwise be continued with impunity for an indefinite period, yet that these distinct quantities may remain in the system unchanged until the whole aggregate quantity shall suddenly produce the effect of a larger quantity given at once, I must in toto dissent from the opinion; indeed, I think we may fairly consider the result of experiment 141 *bis* fully sufficient to prove that hydrocyanic acid does not posses this power; on the contrary, many would, and I believe correctly, regard it as proving the contrary,—that the system becomes habituated to it, and by repetition will endure a dose which, if given at first, would have been destructive.*

* I wished to try the effect of repeated doses of the acid by the mouth, but I found its action so capricious and unmanageable that it is almost impossible to do so. When administered by inhalation, it is far more manageable, as we can withdraw the animal at any moment from the impregnated air.

Whether or not hydrocyanic acid be decomposed in the system I am not prepared to say, but it is certain that it is readily absorbed, and also that it passes off with the respired air by the lungs, for the breath of poisoned animals, both warm and cold blooded, strongly exhales the odour in a short space of time, and I have no doubt the whole is quickly passed off. It does not, however, necessarily follow that the effects of it as speedily pass away; indeed, several of these experiments show that they do not, particularly experiments 39, 56, and 141 *bis*. It is the same with alcoholic drinks, yet no one attributes to them an accumulative property. Hence, a dose which may with impunity be given two or three times a day, because there is time not only for the acid to be given off, but for the effects upon the system to subside, cannot, I think, prudently be repeated every hour or so; for though it is possible the acid may have been given off, I do not think the system would have had time to recover from the depressing influences of it. It was curious to observe that however helpless and paralyzed a dog might be lying, if another dose were given, the first and *immediate* effect of it was to rouse it, and often to produce violent motion.

The poison acts with almost, if not absolutely, equal rapidity and certainty when applied upon a mucous membrane, as the conjunctiva, the rectum, or the vagina, as when swallowed. (See experiments 20, 21, 22, 23, 24, 25, 98, and others.) A knowledge of this fact may be of the utmost importance in a medico-legal examination, as it would not be difficult either by force or cunning to introduce into the vagina, or rectum, or put upon the eye, a sufficient quantity of the acid to quickly destroy life—a mode of administering the poison which a murderer, who had sufficient acquaintance with its properties, is not unlikely hereafter to adopt. Experiments 86, 87, 88, 89, 101, 103, 112, and others, will prove that the action of the acid upon the lungs when air impregnated with it is breathed, is not only rapid, but certain in its effects, and forms one of the easiest methods of exhibiting it—one which it would be very easy to employ, but most difficult after a few hours to detect, as the odour being so diffusible is very soon dissipated.

It is probable that the acid applied to an ulcerated surface would speedily induce death; but of this I have hitherto not had any opportunity of ascertaining the truth by experiment: it would, however, appear, if we may form an opinion from a single experi-

ment (No. 23,) that this is not the case with a recent wound.* I did not repeat the experiment, being averse to inflict the wound for the purpose, as there is not much probability, even if the acid would act freely when so applied, of it being thus used with a criminal intention. I do not think there is reason to suppose the acid readily acts through the epidermis. I have put it within the external auditory meatus, and upon the surface of the body, with little effect; if applied largely it might penetrate and thus act, or its evaporation will act through the respiration.

Much has been said on some recent trials as to the death shriek, as it was then termed, in persons who are suffering under a poisonous dose of hydrocyanic acid. Though it is now generally admitted that the shriek does not uniformly occur in man, it does not appear to be so generally known that this is also the case with animals. The foregoing experiments will, however, show that so far from the shrieking being characteristic of death by hydrocyanic acid in dogs, (and I may also add in other animals, as rabbits, mice, cats,) it occurs in only half the number of cases, and in not more than one-third, if quite so many, very loudly; but when it does occur, the cry is of so peculiar a kind, and so indicative of severe distress, as to give the idea of consciousness on the part of the animal of impending death,—as though it felt that its condition was such as to render all assistance unavailing: it is different from anything I have heard in any other condition of dogs or other creatures, and is, I think, when present, characteristic of the poison.

In, perhaps, a tenth of the cases the fæces alone are passed; in another tenth, both fæces and urine; and in a far larger number, the urine alone: but it so frequently happens, probably as often as in two-fifths of the whole number of cases, that neither fæces nor urine are passed, that we cannot rely much upon these as symptoms. In neither of the two cases I have seen in man were either passed. Their expulsion appears to be owing to the violent spasmodic action of the voluntary muscles assisting the contraction of the involuntary,

* This is opposed by the statement of Sobernheim, of the apothecary who died from the application of the acid to a recent wound of the hand, occasioned by the breaking of a glass vessel in which the acid was contained. It is, however, probable the quantity of acid was large, and not at all unlikely the effect might in reality have been produced by the acid being diffused through the air, and thus acting upon the lungs by respiration, a mode by which, as the foregoing experiments fully prove, hydrocyanic acid acts with considerable rapidity and power.

as the rectum is usually unloaded and the water passed during a strong rigor—often during the violent one, which not uncommonly immediately precedes death. If, instead of a mere unloading of the rectum, there is purging or tenesmus, it may be regarded as a favourable sign, as it was observed in nearly all the dogs, and in several of the cats, that recovered. Vomiting is, of all the symptoms, the most favourable, not only, I apprehend, from the unloading of the stomach, getting rid of part of the poison, but also as indicating that the system is not fully under the influence of it. Vomiting does not occur in recovery after inhalation.

I know of no antidote to hydrocyanic acid.

Chlorine has been much spoken of by many persons, but it is probable these parties have advanced the claims of chlorine rather on theoretical and chemical grounds than from any experience of its utility. It will be seen from experiments 56, 57, and 58, that little good is likely to result from it. In these dogs it was administered much earlier than it is ever likely to be in the human subject, and yet they died quite as soon as those dogs to whom a like dose of the acid had been given, and where nothing was done. We should, therefore, I think, not be justified in placing much reliance upon its efficacy as an antidote. Some persons may consider the quantity of chlorine given not sufficient, but the extreme difficulty, often impossibility, of getting anything swallowed after hydrocyanic acid has been taken, must be borne in mind, and I apprehend chlorine can only be given in solution, and not as a gas, by inhalation.

It appeared not improbable that if an insoluble cyanide of silver could be formed, by administering a solution of the nitrate soon after the acid had been taken, good might possibly result; but this is fallacious. It will be seen from experiments 42, 43, 44, and 45, that the cyanide of silver itself acts as a poison, in a weaker degree, it is true, than hydrocyanic acid, but in a similar manner; and the termination in those dogs (Nos. 46, 47, and 48,) and in the cat (No. 83,) to whom a solution of nitrate of silver was given immediately after the acid had been administered, by no means holds out much hope of any great advantage from this preparation.

Alkalies have been suggested, as readily combining with the acid,

it being thought the compound would be less deadly than the acid. There appears not much value in the suggestion, and experiment 49 shows that potass is not likely to be of any avail.

The preparations of iron I thought worthy of a trial. It seemed not impossible that we might, if these were given sufficiently early, so far convert the acid into an inert prussiate of iron as to render it innocuous. Accordingly I gave iron in different forms,—the red oxide, the fresh precipitated green oxide, and the sulphate, alone and in combination with alkalies, (see experiments 50, 51, 52, 53, and 54,) but in all equally without such effect as to lead us to expect any advantage as likely to result from administering them as antidotes.

If the class of antidotes give us little hope of counteracting the poison by changing its composition, the expectation of relief from remedies against its effects is not much more cheering.

I had formed some anticipation of relief from electricity or galvanism, but the result of experiments 26, 27, 28, 29, and 30, appears to destroy every expectation of benefit from its employment. In experiment 28 the dog recovered after the first dose of acid, but this I believe it would have done had nothing been tried, the dose being small in proportion to the size and strength of the creature. It is true some muscular action is continued longer when galvanism is used than when nothing is done. This, however, appears not to be anything more than the motion which may be induced by galvanism in the limbs of any recently dead animal. Indeed, on comparing experiments 26 and 29 it would appear as if the galvanism, by its continued excitance, sooner exhausted muscular irritability, or nervous energy, for it will be seen that though muscular action continued much longer in No. 26, where galvanism was applied, than in No. 29 where nothing was done, yet that at the end of twenty minutes, when action could no longer be excited in No. 26 it was freely excited in No. 29.

Experiments 33 to 41 show the effects of cold water. This remedy has been very much relied upon from its apparently good effect in some cases, but probably much more from the symptoms appearing to require some such rousing of the system as cold affusion produces. Though the effects of it in these experiments are not such as to confirm the very high expectation which some practitioners have held out of its value, nor to lead to the conclusion that where

a large dose of the acid has been taken much good will be effected by the use of it, yet, I think, we may fairly consider that when the dose has been of barely sufficient strength to destroy life, cold affusion possesses some power for good, and hence it is one of the means to which we should without any loss of time have recourse. In one or two of the cases, I am inclined to think, the plunging was rather injurious than not, and I must take the liberty of warning gentlemen against the supposition that if the moderate dashing of water is useful, a more continued and general application of it would be still more so. This is most decidedly not the case. When the whole of the body was placed in water for more than a very short time, or the douche was repeated too often, or the water allowed to fall with too great a force, the dog appeared to suffer, and harm was done. A moderate quantity of water suddenly dashed a few times upon the face, or the head just plunged in water, produced better effects than placing the whole body in it. This produced depression and shivering. The contrast between experiments 56, 60 and 39, and 35 and 37, will shew this. It must be borne in mind that those dogs and cats which recovered were weak and depressed, and some were paralyzed for many hours, or even days, as Nos. 39, 56, 88, 90, 91, and 141 *bis*, and all appeared to feel the cold and to suffer from it, while warmth appeared to be very grateful to them. I would, therefore, venture to recommend that cold water should be merely dashed upon the head and face, and not, as some have advised, that the whole body should be put into cold water.

The effect of a good shaking ought not to be overlooked. In some of the animals the effects of the poison appeared to be delayed by this, and in several of those which recovered the return of sensibility and motion was, I thought, decidedly accelerated by it; indeed, from its effects upon animals, I am inclined to estimate its value as high as that of anything I have tried.

It is not necessary here to repeat what I have already said of bleeding. It has been stated that in most of the dogs which recovered vomiting took place. This also occurred in the man Jackson, who recovered after taking so considerable a dose of the acid.* It might, therefore, be presumed that the use of emetics would be beneficial. I tried the effect of three preparations—

* *Provincial Medical and Surgical Journal*, August 13, 1845.

sulphate of copper, sulphate of zinc, and tartarized antimony; experiments 59 to 71 will show the result. It will be observed, that if the dose of the acid were small and vomiting were induced, the creature recovered; but, on the contrary, if large, the stomach became insensible to the action of the emetic, even though the dose of this were considerable and administered immediately after the poison. We may, therefore, conclude that where the quantity of acid swallowed has been so small as to be of doubtful effect, or the condition of the stomach such, from the quantity of food which it contains, or, perhaps, spirits, (Jackson had been drinking to some extent before taking the acid, and took this in gin; though we do not know what influence this condition of the stomach and system may exercise, the fact is worth bearing in mind,) as to prevent or delay the speedy action of the poison, the administration of an emetic is proper, and ought to be practised, yet that the experiments hold out not the least hope of advantage from emetics where the quantity of acid has been considerable, even though immediately at hand to be instantly given. But little difference in the action of the three different substances was observed, but of course it would be well to select that substance which acts most promptly.

Whatever may be the value of some stimulants, experiments 87, 87,* 87,** and will show that little advantage is likely to result from sulphuric æther. In these cases it was given in a way likely to test its properties in a more favourable manner than it is probable it ever could be in any ordinary case of poisoning by the acid, and yet, so far from any benefit resulting from it, if any effects were produced by it, the action of the acid was increased in power and rapidity.

It is, however, upon diffusible stimulants that great reliance is placed; and as of these ammonia is the one to which most value is attached, statements having been published which, if corroborated by experience, would show that at least one tolerably active remedy against the effects of the poison was in our possession, I was anxious to ascertain if those favourable opinions were founded in fact. Accordingly, a greater number of experiments with this stimulant were made than with any other supposed remedy or antidote; and they are so varied that it may not, perhaps, be thought presumptive to suppose they will enable us to estimate the true value which should be attached to ammonia. Experiments 73, 74, and 75 will

show the effect of ammonia given internally within a very short time after hydrocyanic acid had been administered by the mouth; No. 100, the effect when given mixed with the acid; Nos. 76, 77, and 78, of it freely applied externally shortly after the acid had been swallowed; No. 97, of the effect of the vapour of it after the acid had been given by the mouth; No. 98, after the acid had been put within the eyelids; Nos. 88, 91, 94, and 99, illustrate the effects of the vapour of ammonia when mixed with the vapour of hydrocyanic acid, both being inhaled together; No. 95, of the vapour inhaled shortly after the inhalation of the vapour of hydrocyanic acid; and No. 96, of the vapour when inhaled previously to the giving of a dose of the acid by the mouth. This latter experiment was made in order to ascertain how far it was possible to prevent the development of the action of the poison by having the system well saturated with the supposed antidote. The liquor ammoniæ was as strong as possible, and in all cases the quantities given were larger than *cæteris paribus* are likely to be administered to man; we may, therefore, consider the test as fairly applied. The conclusion to be drawn from these is, that though on the whole, under some circumstances, ammonia may possibly possess some virtue as a remedy, it by no means merits the praise which has been bestowed upon it, nor are we justified in placing much dependance upon it when the dose of acid has been at all considerable. The external application (and it was freely applied,) did not appear to be of the least value; nor was the administration of it by the mouth much more encouraging, either given shortly after the acid had been swallowed or when mixed with it. The dog No. 75 rallied, it is true, after the ammonia had been given; but when the smallness of the dose of the poison, and the mode of its administration is considered, this case affords very little ground for attributing any other good effect to the ammonia than the inducing of vomiting, which cannot be regarded as the proper action of it, nor for the production of which it would be given. Neither was the vapour of ammonia, when used immediately after the system was affected from the internal administration or the external application of the acid, more successful, while the vapour of the acid appeared to be wholly uncontrolled by the presence of that of ammonia when this was added one minute after the animal had been subjected to it. If those experiments in which the vapour of both the acid and

ammonia were inhaled at the same time be compared with the corresponding experiments where only the vapour of the acid was inhaled, (Nos. 86, 89, 90, 92, and 93, with Nos. 88, 91, 94, and 99,) it must, I think, be admitted that though in some, as Nos. 88 and 89, the difference in the effects was too slight to be regarded; yet, on the whole, those animals which breathed the mixed vapour were less affected than the others. The smell of the mixed vapour is somewhat peculiar, whether merely resulting from the mixture of the two, or from some new compound, I am unable to say, probably only the former; if from the latter it also is poisonous, for it must be observed the effects were the same in kind, being only less violent in degree, and, therefore, as in practice, the poison and the remedy could by no possibility be so used, I think all that can be fairly deduced in favour of ammonia is, that as it may be beneficial we ought to have recourse to it, not with the expectation of deriving benefit from it in severe cases, but that in those cases where the dose has been so small as to render it uncertain which way the balance will turn it may assist it to incline on the side of life. Experiment 95, where the vapour of ammonia was administered, when the animal had only been exposed for the space of one minute to that of not a strong dose of the acid, and experiment 96, where the whole system was, as far as can be, saturated with the ammonia *before* the acid was given, will warn us against the expectation, in ordinary cases of poisoning in man by hydrocyanic acid, of deriving any very marked assistance from its use.

I have not as yet referred to the experiments where more than one antidote or remedy were used, as I have been wishful to ascertain, if possible, the degree of value each one possessed. In practice, however, it may be perfectly proper to combine two or more. No. 59 will show the effects of emetics and abstraction of blood; No 33, of the douche and ammonia; No. 74, of ammonia and the douche; No. 79, of ammonia, bleeding, and cold affusion; No. 56, of ammonia and chlorine; Nos. 20 and 47, of nitrate of silver and ammonia, given under the most favourable circumstances, yet without much effect; and others of other combinations. No. 56 is one of the most remarkable experiments I have witnessed in the singular effects of hydrocyanic acid upon the dog. That the case should not have proceeded to a more legitimate termination mortified me greatly at the time, but from

what I have since seen, (experiments 88, 91, 92, 99, 141 *bis*, in which the symptoms were very similar,) I have but little doubt that the dog would ultimately have recovered. This, with No. 79, might lead at first sight to the supposition that in both the remedies used had been successful. I am sorry that I cannot think so. It would be satisfactory to consider the means used as having been the cause of the continuance of life. This, however, I cannot do; the phenomena arose solely from the inefficiency of the dose. In both the dogs were large, and the quantity of acid comparatively small, while the symptoms soon after the acid was swallowed evidently indicated that the system was not fully under the influence of the poison. To have discovered an antidote, or found out a remedy, or at least to have confirmed previous suppositions, would have been far more satisfactory than to arrive at the conclusion I fear I must do,—that when the dose of the acid has been large, its effects are such as to completely set at defiance all our means of preserving life, even though we were provided with them for immediate application; and that even where the dose has been much smaller, we have no antidotes, while our remedies are of little efficacy, as compared with those which we can avail ourselves of when other agents destructive to life have been used. However, the surest safeguard for the future accomplishment of this desideratum, if it be within our means, is to know our exact position; to know, in fact,—to use a paradoxical expression,—what we do not know.

OBSERVATIONS

ON THE

OPERATION OF OVARIOTOMY,

BY GEORGE SOUTHAM, ESQ.,

Surgeon to the Salford Royal Hospital and Dispensary, Manchester.

Instances of the removal of diseased ovaria have been before the profession for some time; it is only, however, within the last few years that they have accumulated in sufficient number to admit of general principles being deduced from them. By a majority of those who have made the diseases of females their more especial study, ovariotomy is now considered perfectly justifiable; but there still remain some who refuse to sanction it, principally from the apparent high rate of mortality with which it has hitherto been attended. Though we possess a tolerably correct statement of the number of fatal cases, several have either not been published, or so vaguely described, that no reasoning can be founded on them; and as a considerable period has elapsed since their occurrence, the suppression of the particulars can only be regarded as a proof that the operators have thought they would reflect no credit on their judgment either in a medical or surgical point of view. These ought not, therefore, to be adduced as objections, the fault being with the operator rather than the operation.

The solicitation of the patients to be operated upon, though made fully acquainted with the danger, is a proof that the disease is more than an inconvenience, as some have maintained. The difficulty of diagnosis, also, is no argument against ovariotomy, as errors have seldom been committed by those who have cautiously selected their cases.

Having published my successful cases, I deem it a duty to place on record the only fatal case which I have encountered, from which it will be seen that the patient, after surviving seven days, sank from deficiency of the constitutional powers.

Mary Healey, aged twenty-six years, was admitted on the 2nd of May, suffering from an abdominal tumour. She has only been aware of its existence ten months. When first detected it was not larger than a small orange, and was situated immediately above the pubes. It soon increased, extending chiefly towards the left iliac region. She has been married several years, and had five children, the last of which she gave birth to thirteen months ago. Her health, which had been previously good, began to decline during the latter part of her last pregnancy, and after her confinement she became dropsical, to relieve which tapping was resorted to. She subsequently regained her accustomed health, which has continued until the last few months. Soon after discovering the tumour she sought advice, and has been under treatment up to the present time. Bandaging, friction with ointments and liniments, blisters, and a variety of remedies have been tried, none of which have had the slightest influence in retarding its progress. At first the growth of the tumour was slow; latterly it has increased very rapidly. For three months past she has had severe pain in the abdomen, especially on the left side, which has frequently kept her from employment. With the exception of the pain and some degree of emaciation, there has not been much derangement of her health.

When admitted she had the appearance of a person advanced to the full term of pregnancy. The countenance was pale, but not indicative of any constitutional taint, and the pulse, tongue, and skin, presented the usual appearance of health. The abdominal enlargement was caused by a large tumour surrounded by ascitic fluid. In the recumbent position its form could be readily traced, occupying the greater portion of the space between the pubes and false ribs, extending into both iliac fossæ. The most prominent point was just below the umbilicus. It could be distinctly felt to consist of a number of lobes, all of which were very firm and hard, excepting one to the right, which was softer and elastic. The whole mass admitted of a limited degree of movement in the ascitic fluid, showing that it was free from adhesions to the abdominal parietes, but severe pain was produced in the left iliac region when it was drawn upwards or to the right side.

Per vaginam the os and cervix uteri felt healthy, but were considerably raised and directed backwards; the sound passed readily into the uterine cavity, the long diameter of which was an inch and

a-half larger than the average measurement. When the handle of the instrument was depressed, a decided impulse was given to the hand placed on the tumour above the pubes. Per rectum the os uteri and a small portion of the cervix could only be reached. A solid mass occupied the place of the fundus uteri, which, at the first examination, at which Dr. Radford kindly assisted, led to the suspicion of uterine disease; but I afterwards found, by varying the position of the patient, and having the tumour raised, whilst the index finger was in contact with the os in the vagina, and the middle finger with the tumour in the rectum, that the uterus was free from connection with the disease.

No œdema of the extremities, appetite good, eatamenia occur every three weeks, in less quantity than formerly, and attended with slight dysmenorrhœa; urine variable in quantity, but natural in appearance, and not coagulable by heat; seldom without pain in the left inguinal region, which is increased when she lies on either side. Can walk a mile without fatigue, but any great exertion, or sitting long to work, is attended with severe pain.

It was evident that the nature of the tumour rendered the prospect of eure, or even of relief, from the ordinary medical and surgical means, utterly hopeless; whilst its rapid growth, and the patient's present sufferings, threatened not only increased misery but an early death. Under these eircumstances, the constitution offering no apparent obstacle to the operation, I considered extirpation perfectly justifiable; and, in consultation with my colleagues, it was decided upon, if the patient, after being made acquainted with the dangers, wished it. She left the hospital to eonsult with her friends, and having determined upon it, returned in a few days,

After the catamenial period had passed over, and the same preliminaries having been observed as in my previous eases, I removed the tumour on the 21st of May, at eleven o'clock a.m. In addition to my colleagues, Dr. Harland, Messrs. Gardom, Boutflower, Slack, and Withington, there were present Dr. Radford, Mr. Lomas, Dr. Franeis, and several pupils.

An incision, three inches long, was first made through the integuments midway between the umbilicus and pubes; the different muscles and fasciæ were then divided, and the peritoneum exposed. This was punctured, and after about six pounds of ascitic fluid had escaped, the wound was enlarged to the extent

of the outer incision. The tumour was now in view, its surface presenting a fleshy appearance. The finger being passed between it and the abdominal parietes, discovering no adhesions, I attempted to reduce it by tapping. As only a few drops of fluid escaped, the canula was withdrawn, and I proceeded to ascertain the state of the uterus. Some difficulty here occurred, owing to the firm contraction of the abdominal parietes on the tumour, but by extending the incision downwards, and raising the tumour from the pubes, I was enabled to reach the uterus, and satisfy myself that it was not involved in the disease. No obstacle appearing to the removal of the tumour, the incision was immediately extended above the umbilicus, and with moderate pressure on each side of the abdomen, the diseased mass was soon external to the abdominal cavity. It was found to be connected to the left broad ligament, also by rather firm adhesions at its posterior part to the omentum. The pedicle, after being secured with a single ligature, was divided, and the tumour raised towards the chest, that the omentum might be dissected off, near to which a small portion of intestine had contracted adhesions to the tumour, but they were so slight as to be easily separated with the finger. The tumour was now removed, the abdominal parietes closed, and gentle pressure applied over them, to cause the ascitic fluid which remained to escape. After a short interval the wound was again opened to examine the vessels of the pedicle and omentum. No hæmorrhage appearing, the integuments were brought together by twelve interrupted sutures and transparent adhesive plaster. Over these a bandage was applied, the operation being completed within twenty-five minutes, during which she was repeatedly faint, although very little blood had been lost.

After being placed in bed, pulse 85. To have a grain of the acetate of morphine in pill, and toast water when thirsty. The temperature of the room to be kept at 70° Fahrenheit.

Four p.m.—Pulse small, 100; skin moist; no vomiting; passed about half a pint of urine since the operation. Expresses herself as being comfortable.

Nine p.m.—Slept at intervals since last visit; tongue rather dry in the centre; pulse 100; free from pain, except a smarting in the course of the wound; passed urine since last visit; feels hungry. To have some common gruel.

22nd, Eight a.m.—Had a tolerably good night; slept more than an hour at once, and dosed frequently; pulse 92, small; free from pain; tongue moist and clean; complains of slight cough and thirst. ℞. Pulv. Ipecac. Co., gr. iij. tertiis horis capienda. Habeat Misturæ Salinæ, ℥i. secundis horis.

One p.m.—Cough relieved; enjoys the mixture. In other respects the same. To be allowed tea and dry toast.

Five p.m.—Cough has almost left her; tongue clean and moist; passed urine freely during the day; no shivering; skin moist and warm; free from pain. Has taken tea, gruel, and toast frequently during the day.

Ten p.m.—She has felt very low during the last hour, with a disposition to faint. Soda water, with the spiritus ammoniæ aromaticus, has revived her. Pulse 85, small; no shivering. In other respects as at last report. Ordered, a teaspoonful of brandy every hour in soda water or sago gruel whilst faintness continues.

23rd, Four a.m.—In consequence of a sudden attack of dyspnœa having come on, I was sent for. On arriving, I found her gasping for breath; pulse scarcely perceptible; skin cold, and covered with a clammy perspiration; countenance indicative of great distress. Brandy and æther were offered to her, but she refused both. A mustard poultice was applied to the chest, warm applications to the feet, and the bandages cut. These appeared to relieve her, and in the course of an hour she seemed quite comfortable. Pulse 85 and fuller. As she requested that wine might be substituted for the brandy, some sherry was prescribed, with soda water and sago.

Ten a.m.—Appears to have entirely recovered from the attack of dyspnœa; countenance cheerful; pulse 84, feeble; tongue clean, skin warm and moist; passed urine freely; felt hungry about eight o'clock, and took a few table-spoonfuls of milk and bread. Bowels rather uneasy, but no tenderness on pressure. To have a common gruel injection.

One p.m.—The same.

Nine p.m.—No change. Has taken milk and bread frequently during the day. Pulse 80, feeble. The injection produced no evacuation.

24th, Nine a.m.—Passed a good night, having slept the greater portion of it. Pulse 80; tongue clean; slight thirst; skin

perspirable and warm; countenance cheerful; apparently proceeding favourably. Feels inclined to have an evacuation. The rectum tube was passed, which brought away some flatus and a small quantity of fæcal matter. ℞. Extr. Coloc. Comp., gr. viij.; Ol. Cassiæ, gtt. iij. in pilulas ij. dividenda et statim sumenda.

Half-past Four p.m.—Remains in the same favourable condition. Pulse 72.

Half-past Eight p.m.—The same; has had no evacuation. In addition to boiled milk and bread, which she has taken occasionally during the day, had a cupful of beef tea at dinner time.

25*th, Nine a.m.*—Pulse 92, still feeble; skin rather hot, but moist; bowels well moved in the night; cough rather troublesome. Took off the plaster, and found the wound healed from the ensiform cartilage almost to the umbilicus. Seven of the ligatures were accordingly removed. To have a mustard plaster applied to the chest, and repeat the Pulvis Ipecacuanhæ Compositus.

Three p.m.—Cough continues rather troublesome. In other respects the same.

Nine p.m.—Pulse 100, small; appears restless, from mucus accumulating in the bronchiæ, and interfering with the respiration; tongue rather swollen and red. ℞. Mist. Salin. Simpl., ℥vj.; Tinct. Camph. Co., ʒiij.; M. Fiat mistura cujus ℥j. tertiis horis capienda.

26*th, Nine a.m.*—Had no sleep during the night; tongue rather white, but moist; urine higher coloured, and not so plentiful; cough less troublesome. Bowels not having been acted upon since the night before last, a common enema was given. To take the mixture without the Tinctura Camphoræ Composita and the pills.

One p.m.—The injection relieved the bowels, and she appears rather better. Inclined to sleep.

Four p.m.—Restlessness returned. Pulse small and thready, 120; countenance assuming an anxious aspect; has pain in the lower part of the abdomen, increased on pressure. The bandages were removed, and fomentations applied. Pil. Morph. Acet., gr. ss., statim sumenda.

Seven p.m.—Vomited the pill an hour after it was taken; had another attack of dyspnœa, which was relieved by æther; restlessness and pain of the abdomen continue; pulse small, sometimes almost imperceptible; has taken wine and sago occasionally

DESCRIPTION OF THE PLATE.

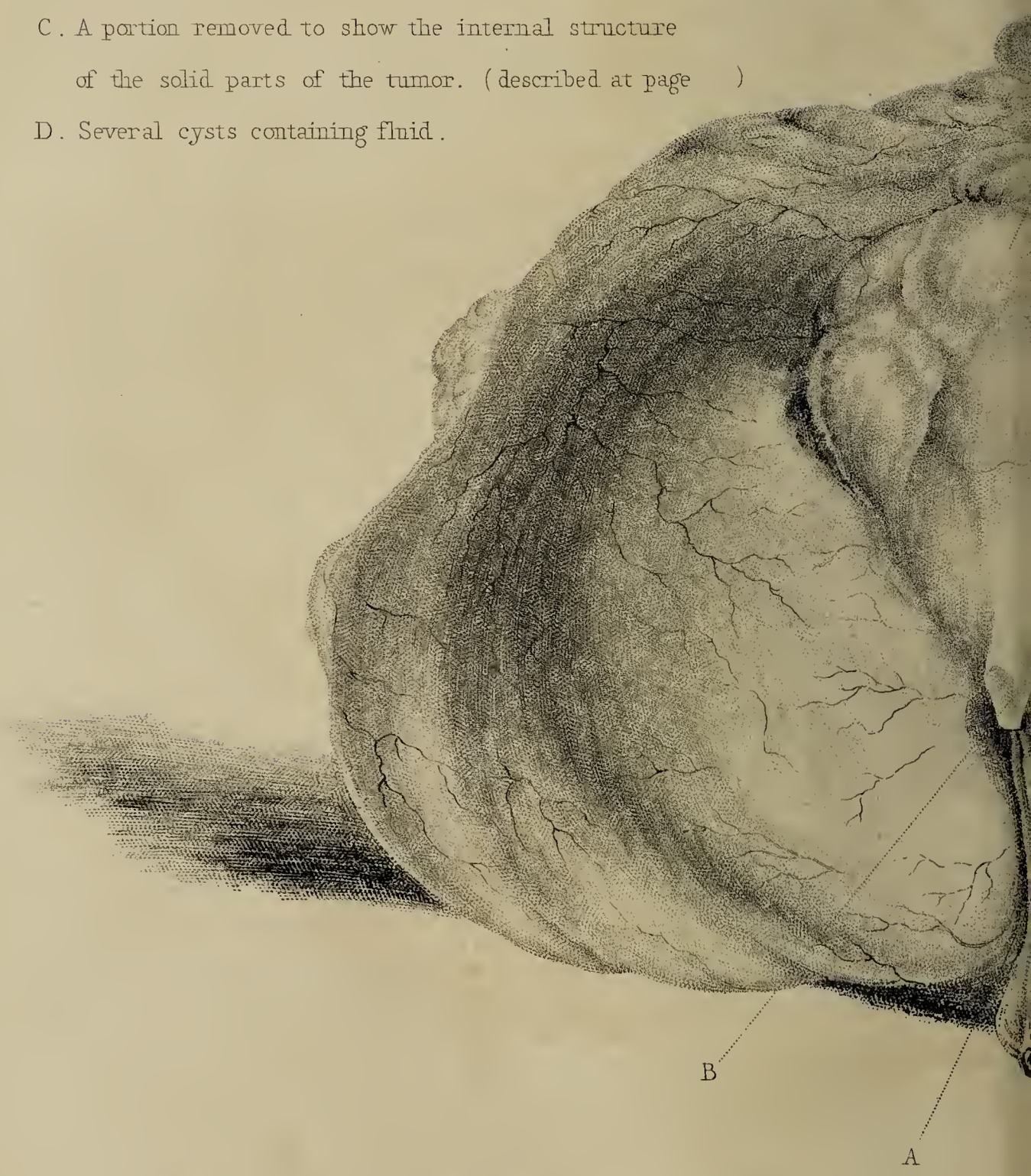
A. The left broad ligament of the uterus, forming the pedicle of the tumor.

a. The vessels consisting of two arteries and a vein.

B. The fallopian tube.

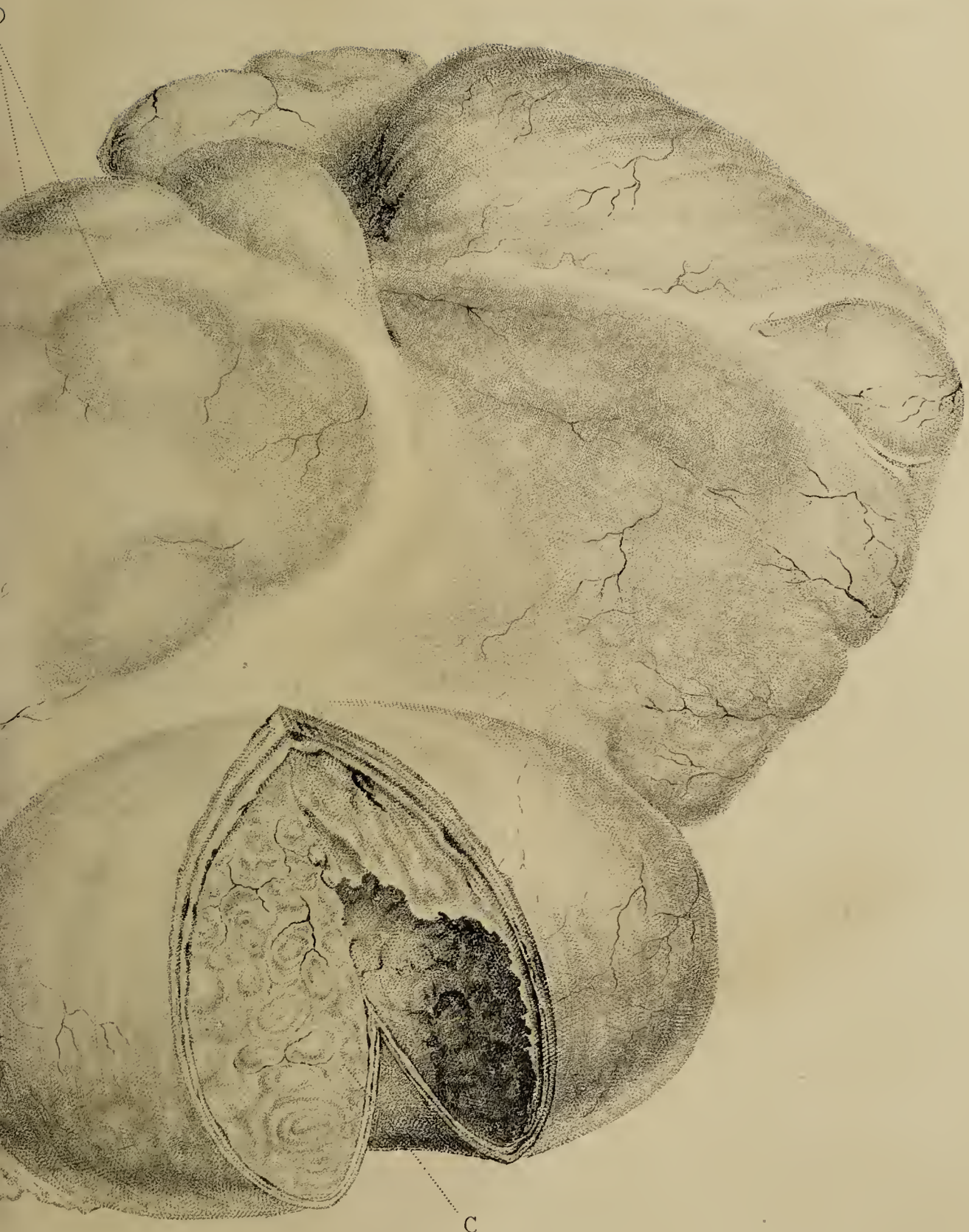
C. A portion removed to show the internal structure of the solid parts of the tumor. (described at page)

D. Several cysts containing fluid.



Drawn from Nature by G.F.Tenniswood.

Mr Southam's



of Ovariotomy.

during the day, but the stomach is now disposed to reject them. As she refused to take any more pills a grain of acetate of morphine was given in solution, shortly after which she slept for a couple of hours. On awaking she appeared refreshed, but in the course of the night the sickness returned. She gradually became weaker during the following day, and died at seven p.m.

Post-mortem examination, sixteen hours after death.—On removing the dressings, the edges of the wound were found disunited, the adhesions which had formed subsequently to the operation having broken down from the efforts of vomiting during the last few hours of life. The edges being separated, the omentum was seen covering the whole of the intestines, of a dark red colour, and adherent to the inner edges of the wound on one side. The intestines were distended with flatus, but with the exception of here and there some slight traces of congestion, they had not an unhealthy appearance. On drawing them up from the pelvic cavity, shreds of recent lymph were seen on the peritoneum, covering the uterus and the parts in the immediate vicinity of the left broad ligament, which had formed the pedicle of the tumour. About half a pint of straw-coloured fluid was contained in the pelvic cavity. The uterus was of the natural size, and its structure healthy. The right ovary exhibited no diseased appearances; a section of it presented a beautiful specimen of a false corpus luteum. The left uterine appendages were encircled by the ligature, the strangulated portion of which was very much swollen, and in a complete state of sphacelus. The other abdominal viscera were healthy. There were no traces of pus. The heart was somewhat larger than usual, and fibrinous clots were found in the ventricles. The inferior lobes of each lung were highly congested, and in some places exhibited marks of recent inflammatory action.

The drawing is a faithful representation of the tumour, which is lobulated, of an irregularly oval or oblong shape, and weighed upwards of nine pounds. Its external surface, in some parts, had a strong fibrous appearance, which conveyed the idea of its interior being composed of solid matter. In other places it was so thin that fluid could be distinguished beneath it. One of the lobes, which appeared solid, was cut into, and a portion removed. The

outer envelope was, at least, three-quarters of an inch in thickness, of a fibrous structure, and vascular; white fibrous bands extended from it into the interior of the tumour, forming numerous septa, the interspaces of which varied in size, some being not larger than a pea, but one was the size of an egg. Most of the loculi in the vicinity of the outer envelope were filled with a cerebriform substance; the others contained either a thick gelatinous fluid, or pus, and in some instances, pus and fluid combined.

Examined under the microscope six hours after its removal.—The bands dividing the diseased mass into compartments exhibited a fibrous structure, the filaments of which were arranged rectilinearly, with here and there irregularly-shaped cells placed between them. The cerebriform matter was composed almost entirely of granules, and cells having a central nucleus and granules within them. In shape they were round or oval, and appeared in various stages of development, the diameter of the larger ones being greater than that of any I had previously met with. The gelatinous fluid contained a few cholesterine crystals and numerous cells enclosing smaller ones, similar to those described by Gerber and Gulliver (see *General Anatomy*, p. 107, fig. 256,) as occurring in morbidly closed cavities.

Remarks.——The unfavourable termination of this case was evidently owing to the state of the patient's constitution, which afforded no indication of being impaired beyond the presence of ascites. This could not be regarded as an obstacle to the operation, as it not only existed to a much greater degree in the first patient on whom I operated, but also in several of the other successful cases that have been recorded. On the contrary, it, in conjunction with the rapid development of the tumour within the last few months, fully justified the propriety of extirpation, as they tended to show that life could be prolonged only for a brief period.

Considering that the disease was not malignant, its growth was probably accelerated by the debility following the patient's last confinement; thus the system, besides not being in a condition to resist the development of the tumour, was prevented by the extra demand upon it from recovering its normal state. The case cannot, therefore, be regarded as injurious to the establishment of

ovariotomy, but proves the necessity of using great caution in delaying, or attempting it, in but slightly impaired constitutions.

Though symptoms of peritonitis manifested themselves during the sixth day, the post-mortem examination sufficiently showed that they had not proceeded to any extent which could not have been checked by the ordinary means, had the patient been able to bear their application. From the sphacelated state of the strangulated portion of the pedicle and the marks of inflammation occurring chiefly in its vicinity, it may be inferred that the plan at present adopted of securing the vessels supplying the tumour, by including the whole of the pedicle in one or two ligatures, is highly objectionable. The risk from the operation would, no doubt, be much diminished if the vessels could be alone secured, which I believe is practicable in a majority of cases, as there are seldom more than three that require tying.

Dr. Simpson's sound instead of aiding in the diagnosis rather obscured it. The uterine cavity was an inch and a half longer than the standard measurement; and on depressing the handle of the instrument a distinct impulse was felt three inches above the pubis, as if its apex had penetrated the substance of the tumour. This, together with the firm and lobulated character of the diseased structure, the presence of a large solid body in the recto-vaginal pouch, the elevated position of the uterus, and the inability to distinguish the fundus uteri per rectum, excited suspicion of uterine disease. But by examining the patient in the erect or bending position, with one finger in the vagina and another in the rectum, the tumour being raised, I was enabled to trace the form of the uterus, the fundus of which was thrown forwards. The age of the patient, the rapid growth of the tumour, the regularity of the catamenia, and the absence of the peculiar sallow complexion, so characteristic of uterine disease, also guided me in the diagnosis.

With respect to the mode of operating, a free incision through the parietes in the first instance would certainly have facilitated the removal of the tumour; but as doubts had been expressed respecting its origin, I considered it more advisable to proceed with caution. Had it proved uterine, and an opening been made large enough to admit of its escape from the abdomen, the contraction of the abdominal muscles would not have admitted of its return, and there would have been no alternative but to remove the

diseased organ, a proceeding which experience has proved to be unjustifiable.

The anatomical structure of the tumour presented some interesting peculiarities. Though it had the usual characters of cystic sarcoma, under the microscope it exhibited many of the appearances usually observed in malignant growths; but after an examination of several varieties of tumours, it appears to me that further investigation is necessary, before the microscope should be allowed to take precedence of the surgical and anatomical means, by which we are accustomed to distinguish the two principal classes of tumours. In most morbid growths, especially those having no analogy to the healthy structures of the body, we may often detect the caudate or irregularly-shaped nucleated cells seen in the various forms of cancer. The varieties of form appear to arise from an arrest in the further development of the primary cells, which generally preserve their primitive condition in proportion to the rapidity in the growth of the disease. It would be foreign to the present subject to enter further on this question, I shall, therefore, close these remarks with the opinions with which I have been favoured by Mr. Goodsir, of the Edinburgh University, and Dr. Reid, of St. Andrews, of the nature of this, and a similar tumour successfully extirpated by me three years ago.

Mr. Goodsir observes—"The portion in the oil silk (the one removed three years ago,*) is a true cystic tumour of the ovary; that in the tin foil (the present case,) is also *cystic*, but by many would be pronounced malignant, or, at least, as having a tendency to *malignant degeneration*. I know them both well; the first is a growth, the cysts of which are filled with matter which may vary from serum to stiff jelly, until the cyst inflames or becomes gangrenous, when the contents may assume a granular or purulent creamy appearance.

"The cysts in the pseudo-malignant resemble those in the simple cystic, but the contents vary in consistence from sarcomatous, through all the shades of medullary, to granular, gelatinous, and serous.

* This tumour Is composed of solid matter and several cysts, which vary in size, giving it a lobulated appearance externally. The solid portion is most prevalent in the vicinity of the pedicle, which has a broad base, The natural structure of the ovary is entirely destroyed, the tumour affording an excellent specimen of cystic sarcoma.—*London Medical Gazette*, 1843.

"I believe in the existence of a true malignant tumour of the ovary, but, as far as my experience goes, it is comparatively rare, and is from the first more or less solid.

"I put very little value on the microscope in detecting the nature of tumours of any kind. It is by what we call in natural history the *habit*, or *general appearance* or *bearing*, of *plant*, *animal*, or *morbid growth*, that the *species* or *nature* in doubtful cases is to be determined. In disease this tact in discrimination is to be acquired not by poring through a microscope, but by experience in the *diagnosis* and *handling* of tumours in the living, and the examination, by the naked eye, of their general appearance in the dead. The microscope can only *verify* the *previous determination*."

Dr. Reid remarks that "the two anatomical preparations sent presented the appearance of being parts of the cystic tumours in the ovary. That wrapped up in sheet lead (the present case,) had a few small patches of a soft substance, of a greyish colour, adhering to its surface, and there was a small quantity of dirty grey fluid lying among its folds. The fluid contained a very great number of rounded cells and granules. These cells had numerous granules, and others had a small cell or nucleus also in their interior. It will save description to say that the fluid, and also the soft substance, presented the microscopic characters described by Dr. Bennett, in the *Edinburgh Medical and Surgical Journal* for April, 1846, in an article on 'Encysted Tumours of the Ovary.' The greater part of the cells and granules resembled those marked *a* in figs. 1 and 6. The greater number of these was from $\frac{1}{2000}$th to $\frac{1}{1500}$th of an inch in diameter. There were others similar to those marked *d* in fig. 5, and some of these measured from $\frac{1}{1000}$th to $\frac{1}{800}$th of an inch in diameter. There were also irregular masses of granules and some epithelium cells. The wall of the cyst presented the appearance figured in fig. 14.

"The other preparation had no fluid within its folds besides the spirits with which it had been moistened, but several patches of a soft greyish substance like coagulable lymph adhered slightly to one of its surfaces. When this soft substance was examined under the microscope, it presented the characters of coagulable lymph mixed with a considerable number of cells with granules and nuclei in their interior, similar to those already described. I would, therefore, say from the specimens presented for my exami-

nation, that as far as I could judge from them, they presented the characters of cystic tumours of the ovary, and that they are not of a malignant nature."

It is evident that these distinguished pathologists do not agree with those who group encysted tumours and carcinoma under the term "malignant disease." On a former occasion (*London Medical Gazette,* 1843,) I offered a similar opinion; and not only have subsequent investigations into the minute structure of morbid growths confirmed the correctness of this view, but the absence of any return of the disease in those who were operated on some years ago, as well as the present satisfactory state of their health, proves that the opposition to ovariotomy, founded on the malignant nature of the tumour, is without foundation.

OBSERVATIONS

ON THE

PATHOLOGY OF ABSCESS OF THE HEART,

WITH A CASE;

BY J. H. STALLARD, ESQ.

Surgeon to the Leicester General Dispensary.

In studying the records of medical cases, the occurrence of carditis and its consequences will be found by no means rare; but it is generally admitted that the cause, symptoms, progress, and termination of the disease are not well understood. Thus, in one instance, we have recorded the most severe form of myo-carditis,* without the manifestation of any special symptoms during life, and, on the other hand, it may be stated that the symptoms which have been detailed in connection with such cases may, for the most part, be explained in a manner more consonant with the known principles of pathology, and, if so, it may at least be doubted whether idiopathic carditis was the cause of them.

The subject is one of much interest, as well in a practical as in a pathological point of view, and the case which I am about to detail having led me to doubt the inflammatory origin of the abscess found after death, I may be pardoned if I enter somewhat at length into the question, and I do so with the greatest deference, as I feel that my opinions require the consent of additional observation for their confirmation.

John Perry, aged sixty, shoemaker, of a short, thick-set, though bloated frame, an inmate in the Leicester Union Workhouse, was seized, whilst at work, with coma, cyanosis, and great prostration. As I happened to be near at hand, I was summoned immediately. I found him with a cold clammy skin, the whole surface of a blue

* *Vide* case of Mr. Stanley; *Medico-Chirurgical Transactions*, vol. vii.

colour, and the face suffused with perspiration. He lay in a semi-comatose condition, but was sensible when aroused; the pupils acted naturally; the pulse full, soft, and feeble, beating 60 in the minute; the respiration slow and gentle. I administered some hot brandy and water, and ordered it to be repeated twice in the day; he also took a dose of common aperient medicine, and his food was to be light and nutritious.

March 23rd, 1844, being the following day. He reported himself better, and stated that he had felt quite well up to the period of his seizure, and that he had never been subject to similar attacks. The pulse is to-day stronger and more frequent, but the respiration is still slow, though not so slow as yesterday; the skin is warmer, and has lost much of its blueness; the heart was carefully examined, its sounds were feeble, but not abnormal in any other way. He has had frequent threatenings of faintness, which have been relieved by brandy and water.

He remained in this state two days, gradually becoming more feeble, and Monday, the 25th, I went as usual to see him, and to the surprise of the nurse, who supposed him to be asleep, I found him dead.

Post-mortem examination.—The lips, abdomen, and extremities were of a dirty blue colour, as though incipient decomposition had already commenced. Head not examined. The cavities of both pleuræ contained much dark-coloured serous effusion; the lungs were congested with black blood, though still crepitant. The heart was fat, flabby, and rather larger than usual, and the pericardium contained about an ounce of dirty serum; the right auricle and ventricle were, comparatively with the left, of normal size, and the valves were quite healthy; the lining membrane was of a deep port-wine colour. (Andral calls this colour violet.) On opening the left ventricle, which was accomplished by a V shaped incision, an abscess was observed. It was situated at the apex of the ventricle, and of a very irregular shape, being most pointed towards the apex of the heart, from the surface of which it was separated by two or three lines of healthy structure; above it projected considerably into the cavity of the ventricle, with which it communicated by a small fissure; the interposed septum was about one line thick, and appeared to consist of thickened endocardium. The cavity of the abscess contained a bloody purulent-looking fluid; its lining membrane was of a light red

Fig. 2

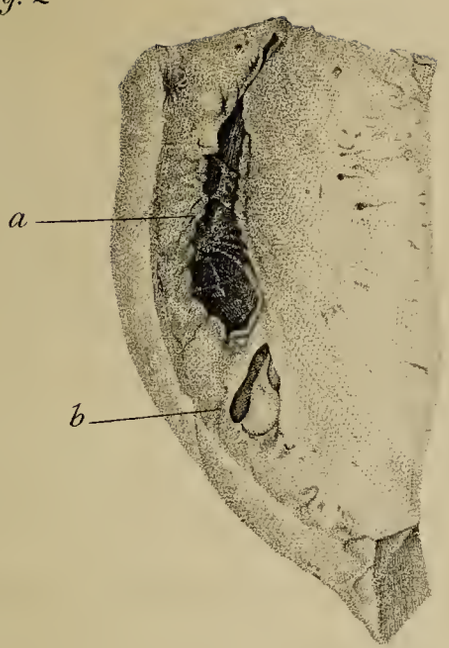
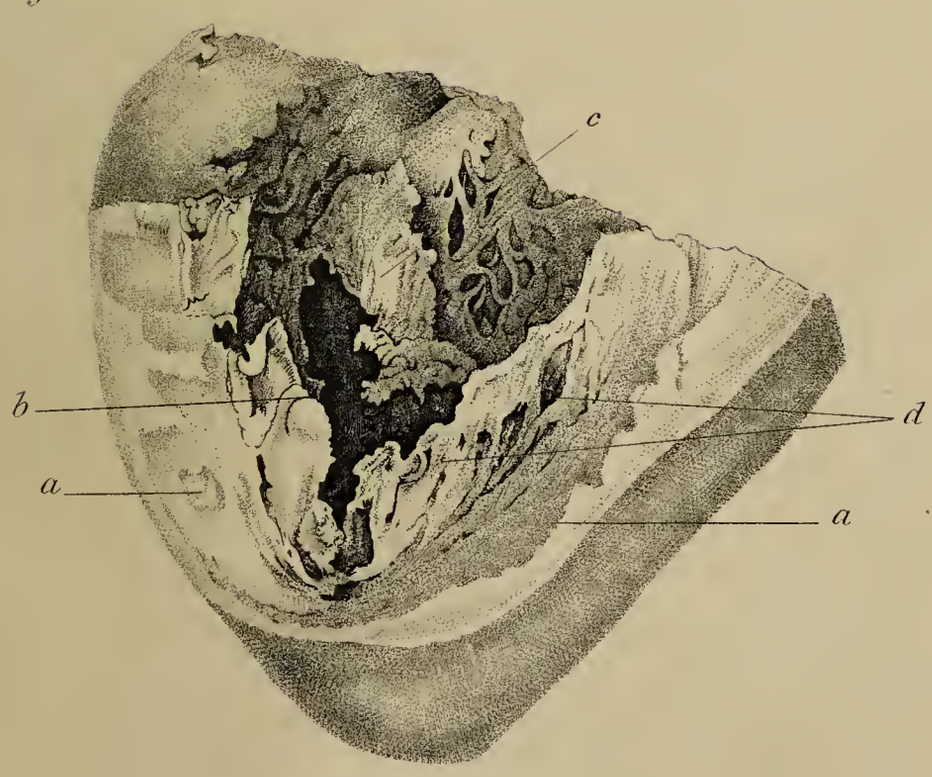


Fig. 1



tint, and presented a granular appearance. Around the abscess the muscular tissue was darker than natural, and in the outer wall of the same ventricle were observed several fissures containing a dark-coloured fibrinous material, and some of these, though not all, communicated with the cavity of the ventricle. (*Vide* drawing, fig. 1.) The coronary arteries were much ossified. The other organs presented the appearances of poisoned and decomposed blood. The liver was soft and congested; the intestines presented the deep dirty-red colour observed in the heart. The kidneys were of normal size; the capsule, owing to incipient decomposition, was everywhere easily separated from the parenchyma; in the substance of both were many serous cysts, all of which were lined with a dark-coloured coating of decomposed blood, and the contained serum was also discoloured. The external surface was granulated, but this appearance did not extend more than a line into the cortical structure. The whole body rapidly decomposed.

Remarks.—When first called to this case the cyanosis being so general and perfect, it struck me there must be re-opening of the foramen ovale, and dreading death from the circulation of venous blood, and finding the patient so faint and feeble, I at once ordered stimuli. The effects of these were so beneficial that I doubted the correctness of my opinion, and became much perplexed; but fearing to use any active measure, I directed the repetition of brandy if occasion seemed to require it.

It now remains to inquire, first, what was the immediate cause of the seizure and of the prolonged life; and, secondly, the cause of the abscess,—whether it resulted from acute or chronic carditis, or whether any other more probable explanation can be given?

I apprehend the first question is easily answered. The seizure doubtless took place when the contents of the abscess became mixed with the blood in the ventricular cavity. The symptoms are clearly those of poisoned blood, aggravated in a great degree by the general depression consequent upon the rupture; whilst the *post-mortem* appearances are all referable to the same cause, except the abscess itself, the existence of which was neither indicated during life nor was it, otherwise than secondarily, the cause of death.

We have now to inquire how the abscess was formed, and the improbability of its origin from acute or chronic carditis has been already hinted at, since no symptoms indicative of those lesions were observed during life. This idea is also further supported by

the absence of endocarditis, or pericarditis, for most, if not all, authorities agree that myocarditis is always accompanied by both. It is true that the membrane which separated the cavity of the abscess from that of the ventricle appeared to be thickened endocardium; but this thickening was limited, and clearly referable to the resistance which had been presented by the projecting fluid.

Again it may be supposed that the abscess was the consequence of chronic inflammation of a small portion of the heart, a condition which has been frequently described, but when we remember that the coronary arteries were much ossified, and that the heart was fat and flabby, we can scarcely conceive that such a heart would be the subject of chronic disease of this description, and especially without producing any disorder of the general health. Lastly, it may be noticed that idiopathic inflammation of muscular structures is very rare.

I would now call attention to the dark-coloured fibrinous material which was found embedded in the substance of the ventricle. It appeared like coagulated blood, and if so, from what source was it derived? It was difficult in the present case to make this out satisfactorily; some masses were quite isolated, whilst others evidently communicated with the cavity of the ventricle by means of small openings between the roots of the columnæ carneæ; in the latter case the blood had probably been forced between the muscles, and a slight rupture of the endocardium having been effected, had escaped into the muscular parenchyma. Effusion of blood in this situation may be accounted for by several other modes than those hitherto noticed.

First. Congestion of the coronary vessels terminating in rupture. This may be supposed to occur when the heart is unable to perform its duties, especially when the latter are increased by disorder or disease; and, again, in all cases of congestion of the right heart accompanied by a flabby condition of the muscular fibres, which would predispose it to this lesion.

Secondly. Partial rupture of the heart's muscular fibres. When by any over-exertion, or by a sudden twist, we rupture a muscular fibre, we feel an excruciating pain, which lasts usually a very short time; but if the mischief be extensive, the pain becomes permanent, and the muscle is rendered more or less useless. Now, as it is not more difficult to suppose that a muscular fibre of the heart may suffer rupture than one of the serratus magnus, inter-

costalis, or gastrocnemius, I have been led to think that this is a frequent cause of angina pectoris, the disturbance being in proportion to the importance of the organ.

Although the connection of this disease with ossification of the coronary arteries is generally admitted, yet the suddenness of the seizure, the dyspnœa, the great anxiety, and the subsequent relief, are very imperfectly explained by this connection, which, moreover, is by no means constantly observed. I merely suggest this as a possible cause of angina, and the idea is borne out to a certain extent by observation; for whilst we may always refer functional angina to a greatly disordered state of the circulation, produced by dyspepsia, &c., &c., we should expect angina, from partial rupture especially, to take place in cases predisposed to such a lesion by ossification of the coronary arteries, and by a pale, fat, flabby, and ill-nourished organ, little capable of sustaining any extra burden.

But, to return to our subject, the case of Dr. Abercrombie clearly showed that rupture of the heart may be partial, and by tearing across small, or even large vessels, be the immediate cause of hæmorrhage. In this instance the partial rupture occurred at the back part of the left ventricle, and, being superficial, the blood escaped into the pericardium; but if it had been in the substance of the heart instead of its surface, it is probable there would still have been some hæmorrhage, although, perhaps, neither so extensive nor so immediately fatal.

Lastly, it may be observed, that rupture of the heart almost always takes place in the walls of the left ventricle, and it is in this situation that abscess is most generally found.

The effusion of blood having ensued upon one or other of the above causes, it might be slowly re-absorbed, continue for a longer or shorter time unchanged, or if its quantity were large,—if it interfered with or depressed the action of the organ,—if the constitutional power were feeble, it would probably become the subject of those changes which have been so well pointed out by Mr. Gulliver in the *Medico-Chirurgical Transactions*, vol. xxii., p. 151.

In the paper now alluded to the following conclusions are drawn:—First. That coagulated fibrine, when removed from the body and subjected to a blood heat, commences to soften in about forty hours, assuming the colour and consistency of pus, but easily

distinguishable from it by microscopic and chemical examination. Secondly. That the purulent-like fluid found in the fibrinous clots of the heart and arteries, and so frequently in the veins, is essentially distinct from pus, and analogous to, if not identical with, softened fibrine. Thirdly. That the softening of coagulated fibrine is an elementary pathological condition of frequent occurrence, quite distinct in its nature from suppuration, although the two affections have been generally regarded as identical.

These changes do not appear to be confined to fibrine alone, but are also common to sanguineous coagula found in the veins, &c., &c. Mr. Gulliver says, "They were observed in subjects who, having had long suffering from various chronic maladies, had great prostration of the vital powers and languor of the circulation, which state seems especially favourable to the formation and softening of clots. If, therefore," he continues, "a vein be obstructed with coagulated blood or fibrine, which cannot easily be absorbed or organized in consequence of the feeble vitality of the patient, the clot may be expected to soften."—p. 148.

Not having a microscope at hand, I was unable to ascertain the nature of the "bloody purulent-looking fluid" in the case of Perry; but in confirmation of the opinion that heart-abscess is the result of softened blood accidentally poured out, I beg to detail the following observation:—A young calf, aged four months, was seized with great difficulty of breathing, prostration, and death in twenty-four hours. After death the pericardium was found covered with a thin layer of lymph, which had a reticulated appearance. The surface of the heart was covered in the same way. The ventricles were filled with dark coagula, and the substance of the walls were of a dark red colour, interspersed with white striæ. The veins were extremely congested, and in many points were portions of effused blood, varying in size from a millet seed to a small nut. The largest coagulum was partially softened, and was separated from the walls which contained it; and this softened matter, which might have been easily called dark-coloured pus, presented under the microscope no pus-globules, but particles of indefinite size and form, exactly corresponding with Mr. Gulliver's microscopic examination of softened fibrine. (*Vide*, fig. 2.)

I have thus endeavoured to show that the case I have related is one dependent upon the effusion of blood into the substance of the heart, that the abscess resulted from softening of the coagulum so

effused, and that this having possibly existed for some considerable time, at length escaped into the ventricular cavity, and caused slow death by poisoning the circulating fluid. I shall now proceed to confirm this opinion by reference to one or two recorded cases, and whilst my observations will tend to show that carditis, or myo-carditis, is more rare than is generally supposed, I by no means assert that it never takes place. Andral cites several cases to show that redness of the muscular substance, observed after death, had been caused by an attack of carditis, and this is also the opinion of Dr. Elliotson; but it is remarkable that in all these cases severe symptoms of cardiac disease preceded death, whereas none, or few, were present in cases specially related as instances of pure carditis.

A case is recorded by Mr. Salter, in the twenty-second volume of the *Medico-Chirurgical Transactions*, which presents several points of peculiar interest. N. P. Sheppard, about fifty years of age, was seized when walking with a violent pain in the region of the heart, producing faintness and a cold perspiration. About a week after this he had another attack, again recurring after a walk of three miles. During the five weeks following he experienced more frequent, but slighter attacks of the same kind, and also dyspeptic symptoms, which, however, were relieved by small doses of blue pill, carbonate of soda, and sulphate of magnesia, together with due attention to diet and regimen. On the 22nd of March, 1834, six weeks after the first seizure, Mr. Salter found him "sitting up in bed, being, from great dyspnœa, unable to lie down." He laid his hand upon the sternum, and said with great earnestness, "It all lies here." His face was pale, features sharp, and expression anxious. Pulse 80, regular; heat of skin temperate; pain of a dull heavy character, slightly increased by deep breathing; feels some relief by raising wind from the stomach. Action of heart seems natural; chest sounds well on percussion, and the respiratory murmur is good. There was no remission of the symptoms from bleeding, blistering, or calomel and opium. On the 23rd he was more restless and anxious; pulse 130, and so feeble as scarcely to be felt; surface of the body cool; bowels open; urine in moderate quantity, with sediment. 24th,—no sleep, restlessness the same; pulse imperceptible at the wrist. He died sixty-five hours after the accession of the acute symptoms.

Post-mortem examination.—Left lung in a state of engorgement, like the first stage of pneumonia: from the cut surface escaped a large quantity of sero-sanguineous fluid. The pericardium and surface of the heart exhibited appearances of inflammation. The surface of the pericardium which had sustained the most intense vascularity was that which lies on the diaphragm; here there were numerous ecchymosed spots and blotches, resembling those observed on the skin in purpura hæmorrhagica. In the aorta were appearances of commencing ossification. The lining membrane of the heart was healthy. The muscular substance of the left ventricle, excepting a small portion a few lines in thickness, had entirely lost its muscular colour; it was of a lightish yellow hue, but still preserved the fibrous character of muscle. From all the cut surfaces purulent matter could be scraped. In some parts small cavities were observed, varying in size from a pin's head to that of a small pea. These were all filled with pus. The mucous membrane of the pyloric half of the stomach was of a dingy red colour, from a spotted vascularity. The jejunum was inflamed.

Mr. Salter supposes that chronic carditis had been going on for six weeks, when acute carditis supervened, which was the cause of the acute symptoms and speedy death.

It appears to me that this case is an apt illustration of the pathology of that form of heart-disease which it is the object of this paper to elucidate; and in commenting upon it I shall not follow the remarks of Mr. Salter in detail, but merely observe that the ability to walk three miles into the country, the dyspepsia, and the natural pulse, are not exactly those symptoms which we should expect even in chronic carditis, and we should be more than usually careful in referring to acute inflammation of the central organ of the circulation such symptoms as those above noticed, together with a temperate skin, and a regular pulse. beating eighty in the minute. It is quite true there were symptoms of a great disorder of the heart, but, I think, none of acute carditis. Nor are the *post-mortem* appearances more satisfactory on this point: surely ecchymosed spots and blotches like those observed on the skin in purpura hæmorrhagica are not the appearances of pericarditis, nor is a healthy condition of the endocardium, as I before observed, compatible with true carditis. Again the discoloration of the muscular fibres may be regarded as the result of inflammation, but this may, at least, be questioned, for both

Drs. Copland and Williams* have found this appearance in cachetic conditions, independent of inflammation. Lastly, can the presence of pus be deemed conclusive? I think not, for in the first place it may be doubted if it were true pus, not having been subjected to the microscope, and, secondly, its presence is more clearly explained by the pathology I have advanced. That the first attacks were true angina pectoris, both the symptoms indicate and the diseased aorta confirms, though Mr. Salter does not say that the coronaries were involved. At all events he tells us that the heart was large, and this is a distinct indication that it had been overworked. Under these circumstances partial rupture would not be improbable, and, in consequence, small quantities of blood would be effused; but until the strength of the heart became materially impaired no change, or a very gradual one, took place. But on a sudden the mischief is increased, the vital power is depressed, the circulation becomes languid and feeble, and then the fibres of the heart itself, as well as the blood extravasated between them, undergo the process of softening, and death results from the general depression which is induced.

A case, bearing a close analogy with that of Perry, but differing in some interesting particulars, is related by Mr. Chance in a late number of the *Lancet*. I have abridged it.

A lively, but delicate lad, aged thirteen, of a scrofulous diathesis, was apparently in perfect health on Sunday, December 21st, 1845, and on that day partook of a hearty dinner of roast pork. In the afternoon he complained of pain in the stomach and head, but this was considered trifling, and he was sent for a walk. In an hour he returned to tea, when it was supposed that his stomach-ache had left him, and he again made a hearty meal. After being in bed a short time he felt sick, but no vomiting occurred until two o'clock in the morning, when the food returned unchanged. In the morning he appeared in a drowsy, half-conscious, state, disinclined to move or speak. At eleven o'clock Mr. Ray, the surgeon in attendance, describes him as being in a low state, disinclined to speak, pallid, and faint; pulse rapid and indistinct; tongue thickly coated in the middle by a dry brown mark about as wide as the finger, on each side it was white, whilst its edges were red. He complained of sickness and pain in the stomach,

* Williams, on "Diseases of the Chest."

and he looked like a boy who had been sick. Immediately after Mr. Ray left he became more and more insensible, so that at two o'clock, p.m., he was in a state of perfect coma, with contracted pupils, the mouth firmly contracted, the pulse too rapid and fluttering to be counted, and with occasional convulsive movements of the arms and legs. On Tuesday he was in the same condition but more convulsed, and on the cheek a distinct pustular eruption had made its appearance, the pustules as full and distinct as small-pox, occupying the space of half-a-crown, and having an inflamed base; besides these he also had a few on his hands. He died at three, p.m.

Post-mortem examination twenty-four hours after death.—Upon removing the calvarium the veins and sinuses of the dura mater were found slightly distended with blood; the vessels upon the convolutions of the brain were more congested than usual; no inflammation observed anywhere; lungs healthy. The pericardium contained about half an ounce of fluid, like pus and water, or, rather, like the contents of the stomach. The vessels of the heart were of large size, and the heart itself was studded all over with black and red spots of effused blood, varying in size from a mere point to a third of an inch in diameter: these spots were most numerous upon the left ventricle, and especially at its upper and back part. The heart was apparently in a state of violent contraction; upon the anterior surface there was a highly inflamed spot, as large as a shilling, covered with coagulated lymph, having a rough aspect; the surface beneath presented the same elevated appearance as abscess in other parts of the body; the texture of the ventricle was firm and dark-coloured, except near the inflamed part, where it was a shade lighter. Upon cutting across this spot transversely, a slit was discovered communicating with an abscess, which was about half an inch in diameter, and this had an opening in the centre of the patch of lymph, through which a probe could scarcely pass, but in the opposite direction the probe passed freely into the cavity of the ventricle.

Mr. Chance goes on to describe the appearances of inflammation of the lungs, and of the bronchial mucous membrane, which was of a chocolate colour: he also describes inflammatory appearances in the stomach, jejunum, and ileum; in the latter it occurred *in patches*. It did not extend to the large intestines, but they nevertheless had

spots of the same red appearance. The liver presented on its upper surface a white streak, extending one inch into its structure.

It is remarkable that all the recorded cases of heart-abscess occur either in delicate youths, or in elderly persons the subjects of diseased coronary arteries. In the present instance it was in a youth, who had evidently eaten an enormous dinner, and it is curious that over-feeding is the recognised cause of this disease in calves. I shall not follow the lengthy remarks of Mr. Chance, but shall once more ask if the *post-mortem* appearances and previous symptoms were produced by myo-carditis? First, then, it is very doubtful if the fluid found in the pericardium was truly purulent; it did not possess the external appearances of pus, and we have no microscopic examination recorded. Secondly, there was pericarditis, but no endocarditis, and the former was evidently consequent upon the rupture of the abscess into the pericardial sac. Thirdly, the appearance of the the heart's substance is opposed to this idea, for we have it "studded with black and red spots of effused blood," far more likely to have arisen from rupture of a coronary vessel. I shall, therefore, submit it as more probable that the distended stomach, by some consequent derangement of the circulation, produced, in one or other of the previously suggested methods, effusion of blood; that this, subsequently softening, escaped into the pericardium, producing a limited amount of inflammation, which closed the opening. The greater part of the puroid matter no doubt escaped in this way, but some evidently got into the blood through the opening into the ventricle, for the coma, subsultus, vomiting, and depression, with the other symptoms observed during life, were clearly those of poisoned and decomposed blood, whilst the *post-mortem* appearances, which Mr. Chance ascribes to acute inflammation, are to be referred to the extravasation of dark and fluid blood, which by position had caused the chocolate colour of the bronchi, the patches of reddened intestine, and the white streak upon the surface of the liver.

I had prepared several other cases for comment, but as I have already extended this paper beyond my prescribed limits, I shall now bring it to a close by a few remarks upon the practical importance of the pathological question which has been occupying our attention; for as the principle of treatment is deduced not so much from the disease itself as from its pathological cause, we shall be justified in using anti-phlogistic measures in heart-abscess

if its origin be inflammation, even though the symptoms be those of excessive prostration; and, on the other hand, should the pathology I have suggested be correct, the exhibition of stimuli is indicated upon the following grounds:—

1st. To stimulate the vital energies, in order to prevent the effused blood becoming softened and decomposed, and thus to favour its re-absorption or organization.

2nd. If the clot shall have already softened and entered the blood, to obviate or at least stave off the effects of poisoned blood, which alcohol has a great power of effecting; and,

3rd. Should the fluid have escaped into the pericardium, to stimulate the system to the production of pericarditis; which, however undesirable under ordinary circumstances, is in this instance curative, since it closes the opening of the cavity, and strengthens the parietes of the heart at a point peculiarly requiring support.

I trust I have now brought together sufficient evidence to induce pathologists to direct new attention to the cause of angina pectoris, and to show the necessity of a microscopic examination of puroid matters found in the substance of the heart before an opinion is formed concerning them. These alone are the objects of my paper, and, as I have before observed, the opinions herein expressed, whilst they are in no way incompatible with pathological principles as at present known, require the assent of continued observation for their confirmation.

EXPLANATION OF THE PLATE.

FIG. 1.—Section of Perry's heart, showing—(*a*) Cut surface of the ventricular parietes; (*b*) Cavity of the abscess; (*c*) Septum between the abscess and the left ventricle; (*d*) Fibrinous deposits between the muscular fibres.

FIG. 2.—Section of the left ventricular parietes of a calf's heart; (*a*) Large cavity containing fibrine, partially softened; (*b*) Small cavity containing the same not softened,

THE

RETROSPECTIVE ADDRESS,

BY WILLIAM HARCOURT RANKING, M.D., CANTAB.,

Physician to the Suffolk General Hospital,

DELIVERED AT THE

FOURTEENTH ANNIVERSARY MEETING

OF THE

PROVINCIAL MEDICAL AND SURGICAL ASSOCIATION,

HELD AT NORWICH,

ON WEDNESDAY AND THURSDAY, AUGUST 19TH & 20TH, 1846.

In preparing the Retrospective Address which I have now the honour of laying before you, I have not been insensible to the responsibility which such an undertaking involves. To wade through the immense mass of periodical and other medical writings which each successive year puts forth, is in itself a task of no ordinary severity; but to do this with that degree of attention which is necessary to ensure that nothing really valuable be passed over, nothing fallacious or unimportant adopted, adds so much to the mental and physical toil, that I feel myself justified on that score alone in claiming your indulgence for the many errors both of omission and commission, which I fear you will not fail to detect before the conclusion of my labours.

In an Address strictly confined to the serious and matter of fact literature of medical science, there is, fortunately for me, but little scope for oratorical display; on the contrary, it is a natural conse-

quence of the character of the present communication, that the style should be somewhat rugged and inharmonious; I shall therefore offer no apology for a lack of rhetorical ornament, being more than satisfied if I shall be considered to have accomplished what alone I have attempted,—the duty of presenting to you a faithful survey of the progress of medicine during the past year.

In fulfilling this duty I have ventured to depart slightly from the beaten track of my predecessors. It has been the custom hitherto, when no separate report on those subjects has formed a part of our Anniversary proceedings, to include in the Address which now falls to my share, a retrospect of one or more of the collateral sciences, such as anatomy and physiology, and medical jurisprudence. It has occurred to me that in this respect a little innovation might be made with advantage, and I have accordingly confined my remarks strictly to Practical Medicine, Pathology, and Therapeutics, with the adjunct of Materia Medica and action of medicines, believing it better to give as complete as possible a survey of one, and that the most important department of our science, than as in the other case a necessarily more superficial glance at several.

Although the bygone year has been one in which the medical horizon has been more than commonly darkened and convulsed by the storms of political discussion, I have not, as perhaps might have been expected of me, accorded any space to the exciting subject of medical reform. I have followed this course, in some degree, from inability to grasp the whole bearings of the subject; for I am free to confess that in the endeavour to gain such an insight into the question as might enable me to include it in this Address, I became fairly bewildered in the maze of contradictory opinions and opposite wishes which the different writers have pourtrayed. I am one of those, moreover, who think with Dr. Cowan, in his admirable Address for the year 1844, that the legislature can do but little to improve the condition of the profession unless we give force to its operations, by the endeavour to work out that *internal* individual reform, which a corrupt nature renders requisite in every pursuit of life; unless we, one and all, cultivate those qualities of the heart and mind which should become the christian and the gentleman, rooting out from our bosoms feelings of mean rivalry and petty jealousy; shunning

as a pestilence those back-bitings, and evil speakings, the open slander, the more insidious "damning with faint praise," but too prevalent among the ill-educated and ill-regulated of our profession. I firmly believe that if we would be honoured and respected, whether socially or generally, as a body or as individuals, we must strive to make that most comprehensive and holy maxim "Do unto others as thou would'st they should do unto you," as it were the spontaneous effusion of our hearts. When we shall have arrived at this most desirable consummation, we shall need no interference from a tardy and indifferent government; we shall have no unjust assumption of dignity on the one hand, no carpings or heart-burnings on the other, but we shall stand forth before the world the grand spectacle of an united, honourable, and intellectual brotherhood, linked together in the one common and glorious cause of humanity, and each, in his own sphere, whether exalted or humble, realizing again the truth of that saying of antiquity once applied to us, but from which, alas, we have too far departed,—"*Homo nulla re ad Deos propius accedit quam in hominibus salutem dando.*"

The subject of quackery I have also thought it advisable to dismiss with a very few observations. Whether or not its baneful influence can be nullified by legislative enactments, seems at best to be a doubtful question. My own conviction is, that the only sure method of arresting its progress, is to diffuse among the uneducated (in the true sense of the word, a large proportion) of *all* classes, a rational acquaintance with the principles by which we profess to be guided. As long as the present deplorable ignorance of everything connected with natural science exists among the extra-professional population, so long will there be found some titled blockhead to go hand in hand with any medical adventurer that may choose to play upon his credulity; so long shall we have used-up victims of fashionable dissipation and hypochondriacal artists to write maudlin nonsense about some of the numerous *pathys* of the day, and to attribute to their absurd practices the recovery in reality due to the desertion of the haunts of folly and the abode of heart-consuming toil for the pure air of heaven and the ways of natural and simple existence.

With these few prefatory remarks I shall now proceed at once to the more immediate object of my Address, commencing with the subject of general pathology.

PART I.—GENERAL PATHOLOGY.

SECTION I.—PATHOLOGICAL CONDITIONS OF THE BLOOD.

The important subject of the modifications in which the circulating fluid is involved, either as a cause or consequence of diseased action, has now assumed a position in the estimation of the medical philosopher such as even a few years back could not have been anticipated. The doctrines of humoral pathology, so long submerged by the attractive but mischievous speculations of "solidism," are no longer regarded as the tenets of a darker medical age; but we rather wonder that with their scanty means of fathoming the arcana of medical science, our forefathers should have been able to come so close to the correct appreciation of phenomena, for which organic chemistry has at length vindicated a logical and intelligible existence.

The investigations of the earlier labourers in this interesting department of pathological research have, I doubt not, been already laid before you by my predecessors; it remains for me to offer you a brief analysis of those additions to the subject which have been made since our last assembly.

The literature of the morbid conditions of the blood in general, has received an important addition in the publication, in our own language, of Simon's splendid work on "Pathological Chemistry;"* as well as in memoirs by Becquerel and Rodier, and Bouchut, together with shorter communications by Polli, Aran, and others.

The diseased states of the blood are arranged by Simon under four categories:—1. That of Hyperinosis. 2. That of Hypinosis. 3. Spanæmia. 4. Heterochymeusis.

The first form, or *hyperinosis,* is that condition in which fibrine exists in excess, and is, therefore, the characteristic of the true inflammatory type of disease. The second form, *hypinosis,* is the directly opposite condition to the above, consisting in a deficiency of fibrine, and is seen chiefly in fevers of an ataxic type, in passive hæmorrhages, and in certain cachectic states of the system.

* *Animal Chemistry*, &c., by Dr. Franz Simon; translated and edited by G. E. Day, M.D., Cantab., 1845.

Spanæmia is that condition of blood in which it is poor in solid constituents, but especially in fibrine and corpuscles. The diseases in which it appears is divided by Simon into two classes. The first embraces those which are primarily dependent upon derangements of the chylo-poietic viscera, such, for instance, as are due to bad food, imperfect chylification, the protracted application of noxious atmospheric or other agencies, (as those of the poisonous metals,) and finally, to inordinate using-up of the circulating fluids.

In the other division are arranged those diseases which do not thus originate, but which seem to depend upon a peculiar state of the atmosphere, the first impress of which is made either directly upon the blood, or indirectly through the medium of the nervous system. This group includes the specific adynamic fevers, scurvy, purpura, &c.

The fourth form, *heterochymeusis,* is made by Simon to embrace all those states of the blood in which some substance is present which does not exist in the normal fluid. In this class we have diabetes, morbus Brightii, the purulent diathesis, &c.

It would be impossible in the brief space into which we have to crowd the numerous contributions of the past year to take further notice of this valuable production of the Sydenham Society, or to do more than give the principal results of the elaborate memoir of MM. Becquerel and Rodier, which we have next to mention.* To adduce the copious analyses upon which the conclusions of these latter authors have been established would be but to inflict a needless tax upon your time and memories; suffice it to say, that the blood of patients labouring under most of the more common diseases, has been submitted to repeated careful investigation, with the result of serving as the basis for the following general deductions:—

1. The simple fact of the development of morbid action, of whatever kind it may be, is sufficient in every case to induce a notable alteration in the composition of the blood.

2. Venesection exercises a remarkable influence upon the com-

* "Recherches sur la composition du sang dans l'etat de santé, et dans l'etat de maladie. Par MM. Becquerel et Rodier."—*Gazette Médicale*, No 50 & 51, 1845; *Encyclographie des Sciences Médicales*, February, 1845; *Half-yearly Abstract*, vol. i., p. 312.

position of the blood, which influence is proportionate to the repetition of the operation. The effect of blood-letting is chiefly exhibited in a diminution of the blood-globules, and, in a less degree, of the albumen also. The proportion of the fibrine is next to unaltered by it, excepting, perhaps, in the case of adynamic fevers.

3. The state of *plethora* and its consequences depend upon an increase in the entire mass of blood, a veritable surcharge in fact of the vascular system, and not upon an increase of certain of its constituents only.

4. A diminution in the amount of blood-corpuscles, which characterizes the condition of the system, to which we apply the term *anæmia,* frequently occurs in diseases, either as an essential character, as a complication, or as a sequence.

5. The development of an inflammatory disease modifies the composition of the blood in a remarkable degree, chiefly by causing an augmentation in the fibrine.

6. Under certain circumstances the proportion of fibrine may fall below the normal average, and, possibly, its physical characters be affected. This occurs in fevers, in metallic "intoxication," and in diseases induced by insufficient food, combined with other insalubrious agents.

7. When any secretion becomes suspended, or even diminished, the chemical principles which enter into the composition of that secretion are retained in the blood. In this manner urea, cholesterine, &c., are occasionally found.

8. There are three diseases in which the albumen of the serum is notably diminished; these are—1, Bright's disease; 2, certain affections of the heart, accompanied by dropsy; 3, severe puerperal fevers.

Such are the general conclusions drawn by the authors from the examination of the blood in diseases. We shall next point out the particulars in which their investigations differ from, or confirm, those of preceding observers.

1. They agree with Andral and Gavarret regarding the increase of fibrine in the phlegmasiæ.

2. They confirm also the experiments of Lecanu and Andral in respect of the diminution of the globules in chlorosis, and in consequence of insufficient food.

3. They agree with Prevost, Dumas, and Andral in the diminution of the globules by bleeding, and likewise in its small influence upon the proportion of the fibrine.

4. They agree in the diminution of the albumen of the serum in Bright's disease, a fact pointed out by Gregory and Christison, and subsequently by Andral and Gavarret.

The chief points in which they differ from preceding writers are:—Firstly, in that plethora is due to a disproportionate increase in the globules as stated by Lecanu, and since by Andral and Gavarret; and, secondly, in the assertion that the fibrine is constantly diminished in severe fevers. They consider, moreover, that they have been the first to establish the exact effect of disease in diminishing the proportion of globules; the diminution of the albumen in all diseases, but especially in the phlegmasiæ, in which case it is inverse ratio to the augmentation of fibrine; the absolute excess of fibrine in many cases of chlorosis; and, lastly, the diminution of the albumen of the serum, not only in Bright's disease, but in heart-diseases accompanied by dropsy, and in malignant puerperal fevers.

The communications which we have now to notice refer to individual morbid conditions of the blood, and first of—

Spontaneous Coagulation of the Blood in the Veins in Cachectic Diseases.—It has, probably, happened to many of us now present to witness, towards the close of lingering diseases, especially those of a cachectic character, the sudden supervention in one or more of the extremities, of tumefaction, conjoined with other symptoms analogous to those with which we are more familiar, as they occur in phlegmasia dolens. We have not, perhaps, been accustomed to reflect upon the cause of this appearance, being satisfied, as we too often are with respect to the ultimate complications of fatal diseases, to regard it as a consequence of "debility," without further inquiring into its pathology. M. Bouchut has, however, departing from this general negligent habit of observation, made the above phenomenon the subject of a very comprehensive memoir, in which he traces the symptoms to which we have referred, to the coagulation of the blood in one or more of the veins of the limb affected, which coagulation is considered by him to depend, not as in phlegmasia dolens upon the obstruction due to inflammation of

the venous parietes, but upon an inherent quality in the blood itself, acquired during the progress of the disease in which the phenomenon is developed.

In detailing the history of the affection the matter contained in the memoir is thus distributed. The first chapter contains a record of the cases upon which the author's opinions are based; the second, a description of the anatomical characters of the disease; the third, the symptoms which announce the coagulation of the blood; and the fourth, fifth, sixth, and following chapters are occupied by the progress and termination, the diagnosis, progression, causes, and treatment of the disease respectively.

The cases upon which the author founds his opinions were principally the following:—Three phthisical women, in the last stage of marasmus; a woman labouring under calculous nephritis, with destruction of the tubular structure of the kidney; a man affected with encephaloid disease of the liver; a female greatly reduced by typhoid fever; a boy ill with a severe burn; and some others, each of whom, from various causes, were suffering under great prostration of the vital powers.

The most common seat of the coagulation is in the veins of the lower extremities; but it sometimes, though more rarely, occurs in those of the arms and neck. It is found also occasionally in the sinuses of the brain, as observed by Abercrombie; and in the pulmonary arteries, and in the veins of the liver, as described by MM. Bouillaud and Baron. The inferior extremities, however, are so much the most frequent seat of the disease, that it occurred in that situation in forty-four cases out of fifty-one observed by M. Bouchut. The author mentions, as a remarkable fact, that the veins implicated are usually those the most distant from the organ chiefly affected by the disease, which gives rise to the cachectic state of the system; he does not deny, however, that in tubercular phthisis and in cancer, the smaller veins in the immediate neighbourhood of the diseased structure may become obstructed by coagula. The extent of the coagulum varies in different cases, but is, as a general rule, regulated by the locality at which the collateral veins originate. The coagulum first appears in the form of a dark clot, which takes the shape of the vessel, but does not adhere to its inner coat. When adhesion does take place, it is supposed by the author to be due to a secondary phlebitis, set up

by the irritation of this clot, but in no case does he believe that the coagulation originates in inflammation in the first instance. After an interval of fifteen or twenty days, the coagula lose their colour, and become tough and consistent, and in some cases even of cartilaginous or calcareous hardness.

The symptoms which announce the coagulation are strictly local, and unconnected with the cachexia, or chronic disease, in the course of which the phenomenon arises. The patient experiences pain in the thigh or ancle of the affected limb, which pain is, in the course of a few days, followed by œdema. The skin is of a dull white colour, as in puerperal phlegmasia dolens.

The diagnosis is founded upon the occurrence of sudden pain in the limb, in the latter stages of a chronic malady, and the rapid supervention of œdema; in such a case M. Bouchut considers that obliteration of the vein may be confidently pronounced to exist.

The prognosis is not unfavourable as far as the local affection is concerned; the danger is entirely dependent upon the anterior condition of the patient. It must inevitably be considered a serious complication when it supervenes in the latter stages of phthisis or cancerous disease, and, under such circumstances, indicates the near approach of a fatal termination. In more favourable cases, either the vein itself becomes pervious by the absorption of the coagula, or, as is more frequently the case, the circulation is maintained by the enlargement of the collateral veins.

In the treatment of this affection, M. Bouchut discountenances depletory measures of all kinds, but trusts entirely to narcotic fomentations, and the internal exhibition of opium.

The next disordered condition of the blood which we shall notice is that which has been described by Dr. Puchelt,* under the title of—

Venosity.—This condition of the circulating fluid is distinguished by a predominance of the venous character, the arterial blood not undergoing those necessary changes upon which the integrity of the system depends. This "venous" state, or cachexy, is stated by the author to exist under two distinct types, the one

* "Das Venensystem in seinen Krankhaften;" noticed in the *British and Foreign Medical Review*, October, 1845.

termed by him the erethistic, the other the torpid, or atonic. The erethistic form is the earlier stage of the venous state, and is principally observed in the young. The torpid, or atonic form, into which the former lapses, is peculiar to old people of the phlegmatic temperament, or is induced by particular habits of life. Several causes of this state are enumerated; they may, however, for the most part, be referred to a single pathogenic condition,—a deficient supply of oxygen in proportion to the requirements of the system.

The effects of the circulation of imperfectly arterialized blood are witnessed in the functional or structural disturbance of every organ of the body. In the brain it gives rise to giddiness, headache, stupor, and hæmorrhagic or serous effusions; in the digestive system it originates dyspepsia in all its modifications; in the lungs it gives rise to congestion, or hæmoptoic engorgement. The diagnosis is made out as follows:—the cutaneous veins are full and large, the pulse slow, the face bloated or livid: there is more or less dyspnœa and palpitation upon exertion, the individual is fat and indolent, the stools are infrequent, and the vision imperfect. The treatment is chiefly hygienic, temperance, exercise, and the use of fresh vegetables being particularly enjoined.

Pyohæmia—Purulent infection—Phlebitis.—The contamination of the blood, by the admixture of purulent matter, gives rise to a train of symptoms of so fatal a nature, and at the same time so surrounded by obscurity, that I shall not deem it necessary to apologize for noticing the recent communications upon the subject somewhat at length. M. Sedillot,* after a close criticism of the prevailing doctrines respecting the purulent diathesis, endeavours to demonstrate that in order for the manifestation of the fearful symptoms of purulent "intoxication," the pus must be of a sanious character, or otherwise different from what we are in the habit of terming healthy pus. He believes the principal cause of the symptoms to be a *gangrenous* liquefaction of parts in a state of ulceration, a state which he has always found to exist, and which he believes to depend upon the strangulation of the tissues by their infiltration with pus.

* *Annales de Chirurgie*, tome vii.; Dr. Bennett's Report, *British and Foreign Medical Review*, July, 1845.

The manner in which pus gains access to the circulating fluid is one of the most important questions connected with the subject, and as such is considered at some length by Hasse* in his admirable work on pathological anatomy. Two opinions appear to be pretty equally supported by pathologists,—one that the pus is entirely the result of secretion from the inflamed surfaces of the veins in which it appears, the other that it is the consequence of a direct metamorphosis of the blood itself. The former opinion has the support of analogy, Vogel having demonstrated the transition of epithelium cells into pus-globules, and Henle that the "primary cell" may be developed into other forms, normal or pathological, as the case may be. On the other hand it is believed by Gendrin that, under certain circumstances, a direct change from the blood-corpuscle into the pus-globule may be witnessed by the help of the microscope, which belief is participated in by Donné. It may be remarked, moreover, that Dr. Bennett,† of Edinburgh, in conjunction with Dr. Craigie, has recorded two cases of purulent infection, in connection with diseased spleen, which he maintains to have been instances of true suppuration of the blood, the pus having been formed independently of inflammation, or of any local purulent collection. It was at first supposed that the globules discovered in the blood were the colourless bodies described by Gulliver as existing in softened fibrine, but their behaviour under certain chemical re-agents appears to justify Dr. Bennett in considering them as veritable pus-globules.

In connection with the formation of disseminated abscesses in the liver, lungs, and other organs as a concomitant of the purulent diathesis, we find some valuable remarks in a recent work by Dr. Budd, which we shall have to notice in a future part of this Address. It was at one time a commonly received opinion that the purulent accumulations found in these organs are not the product of local inflammation, but that the matter is all brought with the blood from the spot at which the primary suppuration took place, and is merely deposited by a species of aggregation. This idea is evidently encouraged in the term of "metastatic," commonly applied to such abscesses. To this opinion Dr. Budd

* *Anatomical Description of the Diseases of the Organs of Respiration, &c.*, 1846; published by the Sydenham Society.

† *Edinburgh Medical and Surgical Journal*, October, 1845.

objects, for the forcible reason that pus-globules being twice as large as the blood-discs, the former could not escape readily from the blood-vessels without the simultaneous extravasation of the blood itself. From this and other confirmatory reasons, he, therefore, considers it "established that the abscesses which form in the liver and other organs after surgical operations and injuries are owing to suppurative inflammation of a vein, and consequent contamination of the blood by pus. The globules of pus mingling with the blood, are conveyed to the capillary vessels of the lungs, (and other organs,) and by becoming arrested there, excite circumscribed inflammation and abscess."

Hasse* likewise denies the substantive transmission of the pus to the locality of the secondary abscess, as does also Mr. Rayner, both of whom admit the explanation based upon the irritation of pus-globules impacted in the capillaries of the affected viscus.

Lebert, however, on the other hand, while he admits the origin of consecutive abscess in local inflammation, does not appear to believe that the inflammation is excited by the irritation of impacted pus-globules. He considers it rather to depend upon a general pyogenic diathesis. In the examination of consecutive abscesses in parenchymatous organs, this writer states, as a distinct proof of their inflammatory origin, that he has witnessed their progress from the first commencement to their complete formation. The gradations which he has observed them to follow are :—1. That of a local and circumscribed capillary injection, the small vessels being gorged with more or less coagulated blood, but in no case exhibiting globules of pus. 2. In the centre of this vascularity a yellowish appearance may be traced, which is, in fact, caused by a globule of pus. 3. In the third place, the purulent process has made considerable advance, but is as yet in a state of simple infiltration; the vascular state continues, but does not augment in proportion to the increase of suppuration. 4. The tissues of the parts which had hitherto been uninjured now break down, and the pus accumulates *en masse*, and forms an abscess.

It appears conclusive from the foregoing considerations that the idea of the "metastatic" origin of consecutive abscess, in the accepted sense of the word, must be abandoned, as it is contrary to reason that the large purulent accumulations which are sometimes

* *Op. cit.*, p. 21.

witnessed, could have been caused by the transportation of pus from the insignificant portion of local venous inflammation, as a consequence of which those abscesses are seen to arise. The conclusion is unavoidable, after the evidence afforded by Lebert, that the contents of the abscess are the result of inflammation of the structure in which it appears; and it is probable, as stated by Budd and Hasse, that the cause of the inflammation is the irritation of globules of pus conveyed with the blood from the seat of original suppuration.

Detection of Pus in the Blood.—The discovery of pus-globules in the blood being a point of great importance in a diagnostic point of view, the attention of pathologists has naturally been turned with some interest to the microscopic examination of the blood, in cases of supposed purulent "intoxication." Lebert* does not hesitate to declare his inability to satisfy himself upon their existence, and Andral entertains doubts whether the pus-globule, when it has entered the circulation, does not undergo a transformation, which prevents its recognition. The question has, however, been set at rest by Heller,† who, having a favourable opportunity presented to him, performed a number of experiments in reference to the detection of pus. He determined that a small quantity of pus produces no very definite change in the blood, but when it occurs in any quantity it diminishes the amount of fibrine; indeed, if the quantity be very large, the fibrine altogether disappears. He noticed that when blood containing pus is entirely deprived of fibrine, the blood-corpuscles subside sooner than the pus-cells, so that these latter form above the blood-corpuscles a dirty-white, flaky layer. When the quantity of pus has been large, he has seen the corpuscles form a layer of a line in thickness. When there was sufficient fibrine remaining to form a clot, he always observed the pus in the uppermost layers of it. From these experiments and from others which he performed by mixing very small quantities of pus with a large quantity of blood-corpuscles, he came to the conclusion that the smallest quantity of pus may be detected even in a large amount of blood. The suspected blood is first allowed to coagulate; the uppermost layer of the clot is then sliced off, mixed with distilled water, and

* *Op. cit.*, p. 282.

† Dr. Day's Report on "Organic Chemistry;" *Half-Yearly Abstract*, vol. iii. p. 31.

strained through a linen cloth in order to separate the fibrine. To the strained fluid distilled water is to be added till all the blood-corpuscles are dissolved. The whole fluid is then allowed to rest for the space of an hour in a tall narrow glass; at the end of that time we find a sediment formed, which, if all the red corpuscles have been dissolved, consists of pus-cells with the chyle-corpuscles of the blood. If after washing this sediment with distilled water, a minute portion of it is placed beneath the microscope, the pus-cells will be distinctly seen, especially after the addition of acetic acid, which brings their nuclei clearly in view. It is impossible to confound these cells with chyle-corpuscles, which never possess nuclei, and are always much smaller than pus-cells.

We are not able to give a perfect analysis of the memoir of M. Aran* upon "multiple abscesses," as the series of papers is not yet completed. As far as the subject is at present advanced, he treats of the disease as it arises under three different circumstances,—that of traumatic fever; of puerpural fever; and the introduction into the system of pus of a specific nature, called by him *purulent intoxication.* The memoir bids fair to be one of considerable value, and will, therefore, probably be noticed by my successor.

In a recent article upon the treatment of the purulent diathesis, M. Tessier† affects to regard it as a less serious malady than the experience of British practitioners, at least, warrants. It is, according to him, sufficient to throw aside our pre-occupations respecting its fatality and the alterations of the blood which it induces, and to consider it as requiring vigorous antiphlogistic treatment, because it originates in inflammation. Whatever be the seat of the inflammatory action, whether veins, articulations, uterus, liver, or lungs, he applies from twenty to forty leeches several times within the first forty-eight hours. He likewise immerses his patient in a hot bath as often as the powers permit, and, in fact, appears to spare no pains to bring his patient to that state of prostration which in this country we should consider to insure his sinking under the consecutive symptoms. Having done this,

* "Recherches sur les Abscès Multiples;" *Archives Générales de Médecine* Janvier, 1846.

† "Sur le Traitement de la Diathese Purulent;" *Gazette Médicale,* No. xii., 1846; *Encyclographie des Sciences Médicales,* Mars, 1846; or *Half-Yearly Abstract,* vol. iii., p. 166.

if the disease does not yield, his next resource is in the tincture of aconite, from which he professes to have derived unprecedented advantages. In general, he observes, the therapeutic effects of this medicine are sensible in twelve hours, causing a remission in the febrile symptoms, and an improvement in the local conditions. Such, indeed, is his belief in the almost specific powers of aconite in cases of this description, that M. Tessier is in the habit of employing it as a prophylactic in puerperal women, and in accidents, whenever the concomitant circumstances are such as to render phlebitic complications a matter of probability.

Anæmia.—It is too much the custom with medical men to regard an anæmic condition of the system as one of trivial importance, and easily to be remedied by the exhibition of ferruginous preparations. Although this may be the case as a general rule in the early condition of the disease, it must have occurred to every practitioner of experience to meet with cases of apparently simple anæmia, in which the established mode of treament is either completely unsuccessful, or requires great nicety of management in order to produce its customary beneficial effects. Impressed with the idea that sufficient attention is not accorded to the affection in question, M. Trousseau* endeavours to vindicate for it a greater degree of consideration than it usually meets with, and though his communication contains many observations arising out of his peculiar theories, which in this country would not be considered worthy of attention, it is upon the whole one of considerable value. His chief aim appears to be to establish two propositions:—Firstly, that anæmia is not in all cases the same affection pathologically considered. Secondly, that the usual tonic treatment is often useless, sometimes positively injurious.

In support of his first proposition the author gives a clear and, doubtless, correct description of the different aspects which the anæmic state is seen to assume, contrasting that arising from direct loss of blood with that more complex form known as chlorosis, in which there is not only an alteration in the constituents of the blood, but another element is added to the chain of morbid actions, by a failure in the energy of, if not a change of structure in, the organs so long supplied with impoverished

* Journal de M. Trousseau; *Encyclographie des Sciences Médicales*, Aôut, 1845.

blood. There is also another form of anæmia, which manifests itself under the influence of some organic lesion, in which treatment directed solely with reference to the "anæmia" is, according to M. Trousseau, either useless or dangerous. Such is the anæmia which occurs in conjunction with morbus Brightii, and in the cancerous and tubercular diatheses. In the consideration of this latter variety of anæmia, the author takes occasion to advance the peculiar theory of an antagonism existing between the tubercular diathesis and an anæmic or chlorotic state of the system, maintaining that in persons known to spring from consumptive or scrofulous parents, it is unsafe to remove a chlorotic condition, as its persistence is a safeguard against the development and localization of tubercles. This preposterous fancy will, I need scarcely say, meet with no response on this side of the channel; its enunciation is valuable, however, inasmuch as it shows to what lengths a fertile imagination may go when the first step in pathological reasoning happens to be a false one. The whole theory is based upon the assumption that tubercles are the product of inflammation; iron is injurious in constitutions predisposed to inflammatory attacks, and may in such induce inflammation; *ergo*, the exhibition of iron in chlorosis may induce inflammation, and therefore tubercle. This is, indeed, a marked specimen of the "non-sequitur;" but I doubt whether it might not be almost matched by the reasoning of other advocates of the inflammatory origin of tubercle. The other varieties of anæmia mentioned by M. Trousseau, are the miasmatic, the syphilitic, (which has been likewise ably treated of by Ricord,) and that caused by lead and other injurious metals.

In a lengthy article upon "arterial bruits," M. Beau* advances opinions upon the subject of anæmia which are somewhat at variance with general belief. He admits two forms of the condition, one which is induced by the direct loss of blood, and in which, therefore, all the constituents of that fluid are diminished; the other, a state which invariably follows upon the preceding, or may be spontaneously induced. In this latter form he maintains, that so far from there being diminution in the mass of blood, as the term indicates, there is an actual increase, but the increase is in the serum alone: he, therefore, proposes to denominate this form

* Nouvelles Recherches sur les Bruits des Artères, &c.; *Archives Générales de Médecine*, Aôut, et seq., 1845.

"polyhemie sereuse," and to this superabundance of impoverished blood he attributes all those symptoms common in the chlorotic state which are usually looked upon as nervous. Contrary to general experience, he denies that any arterial bruit exists in the first form of anæmia, unless a bruit should have been present previously to the loss of blood, and he thus distinguishes it from the second form, in which an arterial bruit is always present. Similar opinions are also maintained by M. Duchassaing.*

A case in which death was produced, apparently by simple anæmia, is recorded by Mr. Pearce,† the fatal event being attributed to coagulation of the blood in the sinuses of the brain. I say attributed, for as there was no *post-mortem* examination, the cause of death was mere surmise, and the case, therefore, loses much of its value in a pathological point of view. It is, however, calculated to put us upon our guard with respect to our prognosis in these usually simple cases. That the supposition of Mr. Pearce as to the immediate cause of death is supported by experience, may be seen in the works of Abercrombie and Dr. C. J. B. Williams, the latter of whom mentions three cases in which coagulation of the blood in the cerebral sinuses was found under similar circumstances. It is also countenanced by the researches of M. Bouchut, to which we have above alluded.

Among other communications upon the subject of anæmia, we may refer to some papers by Dr. Turnbull,‡ which contain a faithful representation of the generally admitted doctrines of the day, and also to a series of essays upon General Pathology, by Mr. Bowyer Harrison,§ published in the same periodical—the *Lancet*.

Purpura.—The next disease which we shall mention as being one which may with propriety be referred to an abnormal state of the blood is *purpura*. We must premise, however, that though we think it right to include this in the category of blood-diseases, that such an opinion is not without its opponents, though it must be admitted that the same may, without doubt, be said of any view which may be taken of its pathology. In order, in fact, to be convinced that

* *Journal de Médecine de M. Beau; Annuaire de Médecine et de Chirurgie*, 1846.

† *Lancet*, June 7, 1845.

‡ *Lancet*, March, 1846.

§ *Lancet*, June, et seq., 1845.

the nature of this disease is not thoroughly understood, we need only turn to a discussion upon the subject, at a late meeting of the Medical Society of London.* We shall there find one speaker regarding it as a local disease, depending upon derangement of the liver and alimentary canal; another denying its dependence upon any one condition of the blood, but liable to co-exist with several; a third attributing it to some peculiar change in the coats of the capillaries, which allows of transudation of their contents, irrespective of any alteration in their constituents. One writer again affirms its identity with scurvy; another denies *in toto* that there is connection between them. On this latter point, at least, some definite conclusion is attainable, as within the past year we have had laid before us several analyses of the blood in both diseases, from which it may be fairly assumed that though allied the two affections are not the same.

Mr. Bush† has analyzed the blood in three well marked cases of scurvy, which occurred in the "Dreadnought," and Routier‡ furnishes us with an analysis of the blood in purpura; a comparison of the two given, side by side, as below, will show at once that a very great difference is perceptible.

	SCURVY.	PURPURA.	HEALTHY BLOOD.
Water	849·9	795·244	788·8
Solid Constituents	150·1	204·756	211·2
Fibrine	6·5	0·905	3·2
Albumen	84·0	.....	67·2
Blood-corpuscles	47·8	121·701	133·7
Salts	9·5	.....	6·8

In purpura the predominant feature is the great diminution of fibrine, which does not even attain to one part in 1,000; in scurvy, on the contrary, the fibrine is nearly double that of healthy blood. The other solid constituents, again, are but little diminished in purpura; in scurvy they fall from 211 to 150. In purpura the blood-corpuscles are not materially diminished; in scurvy they scarcely amount to a third of their normal proportion. Lastly, the water is considerably increased in scurvy, and but slightly so in purpura. In as far, therefore, as it is justifiable to draw any

* Reported in the *Lancet*, and other periodicals, of October, 1845.

† *Simon's Chemistry*, vol i., p. 315; note by Dr. Day.

‡ *Half-Yearly Abstract*, vol. i. p. 330.

deduction from the above few analyses, we may pronounce that purpura is a disease characterised by a loss of fibrine; scurvy, on the other hand, is distinguished by a loss of the other solid constituents of the blood and of the globules.

Leaving, however, the discussion of the open question of the nature of purpura, we will turn to the consideration of such information respecting its treatment as the last year has produced.

Dr. Neligan has published a short paper in the *Dublin Journal* for November, 1845, in which turpentine in large doses is said to have cured the disease in a speedy and effectual manner. Three cases are given, the first being that of a child, aged six, who was attacked with purpura during the progress of scarlatina; the second was an adult of intemperate habits; the third, a remarkably delicate child, aged five, in all of which the disease had assumed a serious aspect. The turpentine was exhibited to each in combination with castor oil, both by the mouth and rectum, the dose for the adult being an ounce of each, that for the children about half that quantity. The effect of the medicine in Dr. Neligan's hands was to induce free purging, and in some cases vomiting, but its styptic properties at the same time effectually checked the hæmorrhagic tendency.

As an adjunct to these instructive cases, I may, perhaps, be allowed to mention one which occurred to myself a few weeks back, in which the turpentine given, according to Dr. Neligan's directions, appeared to act with equal decision.

A farming lad, aged eighteen, was admitted into the hospital to which I am attached in the following condition:—The entire surface of the body was covered with purpurous spots of various sizes, intermixed with large bullæ containing extravasated blood. The boy was passing blood by vomiting, by the bowels, and by the kidneys. He had copious hæmoptysis and epistaxis, and blood was freely exuding from the lips and gums. As might be expected from the loss of blood from these various surfaces, which had been going on for three days before admission, the patient was reduced to the lowest stage of prostration; indeed, so severely depressed was he, that fears were entertained that he would not survive the night. The house-surgeon, previously to my seeing him, had ordered him free doses of acetate of lead and opium, with stimulants, but no cessation had occurred either in the sanguineous purging or vomiting. I immediately ordered him an ounce of

rectified spirits of turpentine with castor oil, from the moment of taking which he neither had an evacuation of blood from the bowels, nor from any other mucous surface. Contrary to my expectations, however, I found that the draught had not purged him, and as I was anxious to remove any melænic accumulation that might remain, I repeated the turpentine per anum, but without any other perceptible effect than improvement in all the general symptoms. Eventually I was obliged to exhibit calomel and jalap, and in a few days the patient was perfectly well.

Whether in the above case the lead and opium treatment might eventually have been successful, it is, of course, impossible to say; it may, however, be mentioned that Dr. Hogg* has related an instance in which that treatment has the credit of the cure, though it must be allowed that the evidence in its favour is not altogether unimpeachable. Dr. Ross,† of Boulogne, recommends the ergot of rye in purpura, and relates a very severe case which yielded to its agency.

Effect of Hydropathy upon the Blood.‡—Lest there should be any amongst us, which I trust there is not, with a tendency to desert legitimate medicine for the crooked ways of water-quackery, we may mention, as a caution, that a German physician, M. Albert, who has had ample opportunities of witnessing the operation of the water-cure, has remarked that persons who have pursued the system uninterruptedly for two or three months, are apt to acquire a habit of body not dissimilar to that of scurvy. The pulse becomes accelerated, soft, and feeble. The patient is subject to palpitations and a continual feeling of lassitude, and eventually suffers from spongy gums and aphthous ulcerations of the interior of the lips and cheeks. From these symptoms M. Albert concludes that the immoderate use of water has a tendency to impoverish the blood.

SECTION II.—ZYMOTIC DISEASES.

In the class of morbid phenomena above considered, which I have ventured to place under the separate head of "blood-diseases," we recognise a train of symptoms which we can only refer to

* *Lancet*, July 15, 1845.

† *Lancet*, August 2, 1845.

‡ Medicinische Correspond. Blatt; *Half-Yearly Abstract*, vol. ii., p. 198.

variations in the proportion of the respective elements of the blood, or to the admixture with it of some tangible deleterious substance, as pus, urea, bile, &c. In the class of maladies which I now propose to review, many may, in one sense, be equally regarded as "blood-diseases," but there is this difference, which warrants their being considered under a separate category,—namely, that the agents which impress the blood with the morbid principle are inappreciable to the senses, and are, moreover, supposed to be propagated in the system by a process analogous to that of fermentation. This class will, therefore, include fevers general and special, plague, glanders, and so forth. We shall first notice what has been recently published upon the subject of fever.

Fever in general, Etiology of.—The question of the origin of epidemic visitations has ever been one of the most obscure subjects which falls within the province of the medical inquirer, and, like all other questions of difficulty, has given rise to the most opposed opinions. To distinguish the essential from the accidental concomitant of a disease, requires a mind of no inconsiderable analytical qualifications, even when that disease is one whose manifestations are simple, and subject to little variation. It cannot, therefore, be a matter of surprise that a malady to which the epithets "varium and mutabile" is far more applicable than it is in its original and ungallant association, should in its etiological bearings offer difficulties of an unusual character.

In a pamphlet recently published by Dr. Corrigan,* the author points out the potent influence exercised by famine as an exciting cause of fever. That a close connection does in reality exist between deficiency of nourishment and the occurrence and severity of fever, will not be disputed by any one who is familiar with the diseases of the poor, though it may reasonably be doubted whether Dr. Corrigan has not exaggerated its influence in regarding it as the sole cause of those fearful outbreaks of fever to which Ireland is subject. That it is a most potent auxiliary cause will, I think, be generally admitted.

The method adopted by the author in order to establish his position, is that of analyzing the principal epidemics which have

* On "Fever and Famine, as Cause and Effect," 1845, p. 33.

appeared during the past century, by which he demonstrates that whatever may have been the variation in other important features of their history, one condition was invariably present, and that one condition is famine. In corroboration of this assertion he adduces the following summary of events. In the year 1728 an epidemic of fever appeared, which lasted four years; it was preceded by bad harvests, and accompanied by distress, which reached even the middle classes. In 1734, after another unproductive harvest, fever set in, and disappeared in 1736, when an abundant crop was gathered. In 1739–40 provisions were dear, and remained so until the close of the year 1741; during this period there was every variety of weather and temperature, but fever continued unabated. In the following year, when bread was unusually cheap, there was, the author states, scarcely a fever case to be found among the poor. The year 1797 and four consecutive years, were remarkable for scarcity, and in 1798 the horrors of civil war were added to those of want. In this period fever raged to a fearful extent, and continued unabated until, in the year 1801, a most abundant harvest caused it to decline. The years 1817, 1818, and 1819, were in most of their features similar to the preceding; the corn rotted uncut upon the ground, the potatoes did not ripen, and the turf was spoiled. During this period, out of a population of six millions, one million and a-half were attacked with fever, and 65,000 died. The last epidemic to which Dr. Corrigan refers is that of 1826; it is similar, excepting in intensity, to those already mentioned.

From these remarkable facts the author concludes that epidemic fever has not, in the case of Ireland, depended on climate or season, as it raged through heat and cold, through wet and drought; nor upon changes in the condition of the poor in respect to cleanliness ventilation, &c.; neither upon contagion alone; but that as famine is invariably found preceding and accompanying the fever, we are justified in making out this condition as its great cause.

Malaria.—Nothing has transpired since our last meeting tending in any measure to elucidate the subject of miasmatic exhalations. Dr. Salvagnoli Marchetti* believes that the exhalations from salt water marshes are far more injurious than those arising from fresh

* Statistics of the Maremma; *British and Foreign Medical Review*, January, 1846.

water alone. He affirms that the most insalubrious marine marshes may be rendered innocuous by the mere exclusion of the sea, and instances one spot near Varregio, now selected as a watering-place, which was formerly uninhabitable from the prevalence of fever. He explains the greater unhealthiness of salt marshes upon the supposition in which we should not be inclined to participate,—that marine vegetables undergo the putrefactive process more rapidly than those of fresh water. M. Rigaud de l'Isle has condensed the air of marshes, and confirmed the former experiments of Thenard and Moscati, by obtaining an unctuous animal extract of a cadaveric odour. Levy* also admits the organic nature of miasmata, and attributes the noxious principle to this ingredient, rather than to carburetted hydrogen, as is maintained by some.

Typhus and Typhoid Fever, Identity of.—The French Academy has recently been occupied by discussions respecting one or two points of great importance in the pathological history of fever. The questions of essentiality or non-essentiality, of its dependence or non-dependence upon inflammation of the Peyerian glands, have at length ceased to be agitated, and in their place we have that of the identity or non-identity of typhoid with typhus fever, and of its contagious nature. The discussion on these points originated in the presentation of a memoir by M. Gaultier de Claubry,† in which both propositions were distinctly affirmed. M. Rochoux, who opened the debate which ensued, denied the identity of the two diseases, on these several grounds:—1. That typhus was contagious; typhoid fever not so. 2. That the former attacks at all ages; the latter rarely occurs before fifteen, or after forty. 3. That the peculiar delirium and eruptions of typhus are not observed in typhoid fever; and, lastly, that the duration of the two affections is different, being in the one case from ten to fifteen days, in the other, from twenty to thirty.

This confessedly intricate question is extremely well reviewed by a writer in the *Dublin Journal*,‡ who discusses the objections of M. Rochoux *seriatim*, after the following manner:—

The first point of difference which M. Rochoux endeavours to

* Traité d'Hygiene, Paris, 1845; reviewed in the *Medico-Chirurgical Review*, January, 1846.

† *Reveu Médicale*, and *Archives Générales*, Juillet, 1845.

‡ September, 1845.

re-establish is the circumstance of contagion. This argument the author of the article alluded to shows to be of little value, as the typhus of Ireland is not always contagious, any more than the typhoid fever of Paris. As a proof of this, he states that out of 9,588 cases of fever admitted into the Belfast Hospital, no trace of contagion could be discovered in 2,342.

A second ground of distinction much insisted upon is the different ages at which the two diseases occur. This is opposed by the author for two reasons:—1st. That much error is committed in estimating ages, from the omission to notice the fact, that as it is the custom for the youth of both sexes to congregate in Paris from all parts of the French dominions, the majority of patients of all classes must necessarily be near the age of puberty. 2nd. That the reason why typhoid fever is said never to occur in children, is that the French pathologist is apt to deny the existence of the disease, unless he has an opportunity of seeing the diseased bowels, which, as children, comparatively speaking, seldom die of fever, he has but little opportunity of doing. But, as the author observes, the objection is completely reversed by the fact, that cases are on record in which the rose-coloured spots of fever were visible even at birth. On the other hand he remarks, that the true typhus of Ireland is equally rare among children with the typhoid fever of France, and equally uncommon among aged persons, since of 11,209 cases admitted into the Belfast Hospital, 301 only were under six years of age, and 171 only were over sixty. The other objections of M. Rochoux meet with the same opposition at the hands of the author, who therefore concludes that there are no just grounds for regarding the two diseases as distinct affections, but that the most which can be said is that they are varieties of the same type of fever.

Contagion of Fever.—The question of the contagious nature of typhus, maintained by M. Gaultier de Claubry, is also defended by M. Jacques* and M. Patry,† both of whom have presented memoirs, with the express intention of advocating the doctrine. It seems strange that our French neighbours should be still in doubt respecting a point which in this country has been so satisfactorily determined.

* *Archives Générales*, Aôut, 1845.

† *Gazette Médicale*, No. 21, 1845.

Treatment of Fever.—We have but little to report from the writings of the past year which can be considered as at all auxiliary to our previous knowledge with regard to the management of fever cases. We may, however, acquire this one idea from their perusal, that these cases *get well,* but are not *cured.* Nature is the main agent in the benefit produced, and he is the best physician who most clearly acknowledges her power and interferes least with her operations. He is the worst who is ever attempting to force her to bend to the potency of his drugs.* The most useful hints on the treatment of the various symptoms of fever which have been placed on record during the period embraced by the present report are, perhaps, to be found in the clinical lectures of Dr. Corrigan,† of Dublin, which have always struck me as being replete with sound pathological doctrines. Among the various points which he has touched upon, his remarks upon the time and mode of exhibiting wine in fever, and upon the means of procuring sleep, are particularly valuable.

Professor Huss‡ has found much advantage in the free ablution of the bodies of fever patients with chlorine water, especially when practised in the earlier periods of the disease. He likewise speaks highly of phosphoric acid as a stimulant in the adynamic forms of fever, and of musk where there is great cerebral or nervous excitability.

Nephritic Complication in Typhus.—Dr. Aldridge§ speaks of an affection of the kidneys, which occasionally supervenes during fever. Like other complications this affection is frequently latent; it generally arises during the period of prostration, and is indicated, according to the author, by scanty, high-coloured, and transparent urine, with torpor of the cerebral functions. The urine is neutral or alkaline, and deposits no sediment on cooling. The same condition of urine is also noticed by Dr. Corrigan in the admirable clinical lectures above referred to.

Epidemics of Fever.—The periodical press of the last few months

* As there appears to be at the present time a tendency to exaggerate the power of the "Vis Medicatrix Naturæ," the writer thinks it necessary to premise that it is in fever and other diseases alone which have a definite course to run, that he would consider the above observations applicable.

† Published in the *Medical Times*, *Dublin Hospital Gazette*, &c.

‡ *Gazette Médicale*, No. xxi., 1845.

§ *Dublin Hospital Gazette*, December 15, 1845.

contains descriptions of the epidemic occurrence of fever, by Drs. Wardell,* Watson,† and Shearman.‡ That described by Dr. Wardell is the remarkable and new form of fever which appeared in Scotland in 1843-44, and the history of which had previously been fully given by Drs. Alison, Cormack, and others.

The fever, the history of which is related by Dr. Watson, occurred in Liverpool at the close of 1844, and is considered by him as in most respects identical with the Scotch epidemic; unlike the latter, however, it did not break out in the first instance among the poor, and could not, therefore, in the author's opinion, be ascribed to destitution. It was not observed to be contagious. The local complications varied according to the locality; in the higher parts of the town thoracic affections prevailed, in the lower and less ventilated, diarrhœa was generally present.

The epidemic recorded by Dr. Shearman, of Rotherham, seems to have originated in miasmata evolved by ill-regulated sewers, and the simultaneous opening of numerous graves. A curious feature in the disease was that it attacked almost exclusively in the first instance servant maids and others who were exposed to the early morning air. The type of fever appears to have been ordinary typhus, with bronchial complication.

Post-Febrile Ophthalmia.—Several writers, among whom we may mention Drs. Jacob,§ Mackenzie, and Anderson,‖ have treated of a peculiar and destructive inflammation of the eyes consecutive to fever. The period at which it occurs is stated by Dr. Anderson to have been during the fever in ten out of 135 cases; at the commencement of convalescence, in thirty-five; a fortnight later, in twenty-nine; at the end of a month, in thirty-one; and within six months, in the same number. His treatment consisted in bleeding and mercury; that followed by Dr. Jacob in leeching, antimonials, and turpentine.

Among other essays connected with the subject of fever, of which we can do no more than mention the titles, are a paper by Vierordt on "The Pathological Anatomy of Typhus," (Schmidt,

* *Medical Gazette*, January, 1846, et seq.

† *Provincial Medical and Surgical Journal*, April, 1846.

‡ *Medical Gazette*, February, 1846.

§ *Dublin Medical Press*, January 14, 1846.

‖ *Monthly Journal of Medical Sciences*, October, 1845.

Jahr, bd. 49, No. ii, 1846;) one by Hamernjk on "The Diagnosis of Typhus," (*Ibid*, bd. 50, No. iii, 1846;) and one by Mr. Grantham on "The Therapeutic Effects of Nitrogen in Typhus Fever," (*Medical Gazette*, December, 1845.)

Yellow Fever.—The pathology of this severe malady, which has lately been invested with unusual interest from its appearance on our own shores, is ably treated of in a communication from the pen of Dr. Nott,* of Mobile, giving the particulars of several epidemics witnessed by him in that locality. In seeking to determine the nosological status of this fatal disease, he comes to a conclusion, of the truth of which little doubt can be entertained, namely, that it is a special fever, and like other fevers, subject to considerable variations in its leading characters, according to the local or individual circumstances under which it arises. The author eulogizes, as every candid reader must do, the philosophical researches of Louis upon the disease as it occurred in Gibraltar, but finds it necessary to differ from him in some particulars. Louis, as may be remembered, considers the leading characteristic of yellow fever to be a "peculiarly anæmic and friable condition of the liver, giving to it the colour of butter." This appearance was not found by Dr. Nott as a general rule, being present in only one-third of his cases. It may be observed, however, that Dr. Imray,† to whom we are also indebted for an essay on the fever in question, sides with Louis.

Dr. Nott has examined with great minuteness the condition of the blood and secretions in yellow fever. As in other fevers, the blood was found to be dark and grumous, and exhibited but little disposition to coagulate. The peculiar and fatal symptom, the black vomit, is decided by actual experiment to be blood, modified by admixture with the acids of the stomach.

The causes of yellow fever are discussed both by Dr. Nott and Dr. Imray; the former, however, goes no farther than to admit, what cannot in the present day be doubtful, that it is a poison which by some means or other gains admission to the blood, and then propagates itself by zymotic action. He does not pretend to decide whether the poison be of animal or vegetable origin. Dr.

* *American Journal of the Medical Sciences*, April, 1845.

† *Edinburgh Medical and Surgical Journal*, October, 1845.

Imray examines the question upon a more extended basis, and discusses the opinion held by some that the exciting cause is of malarial origin, differing only from that which originates the intermittents and remittents of tropical climates, in the degree and concentration of its effects. He considers this opinion to be a fallacy, since there are many localities, as the islands of Dominica and St. Lucia for instance, in which circumstances necessary to the development of malaria exist in a high degree, without the production of yellow fever, while, on the other hand, in the neighbouring island of Barbadoes, to which intermittent fever is comparatively a stranger, yellow fever forms a fearfully large item in the bills of mortality. Another reason which he considers to militate against the identity in origin of yellow with intermittent fever, is the fact that the former does not appear to be influenced either by season or temperature, being equally rife in wet seasons and dry; when the temperature was high, and when it was low. In this he is quite borne out by the observations of Rufz. As regards its contagious nature, he expresses his disbelief in strong terms; though he appears, like all the opponents of contagion, in whatever disease the question is discussed, to rely upon that species of negative evidence which is, in our opinion, but little worthy of credence.

You are all, I presume, familiar with the details of this fatal fever as it declared itself on board the "Eclair," and I need not, therefore, trouble you with a recapitulation of its characters. I shall merely observe that an article appears in the *Edinburgh Medical and Surgical Journal*, of January, in which the writer calls in question the fact of its having been true yellow fever, regarding it as that variety of typhus known under the denomination of "ship fever," which is liable to originate in vessels constructed of unseasoned timber, especially if they are not kept dry and clean.

It is impossible to leave the subject of yellow fever thus cursorily touched upon, without referring to a circumstance which reflects an undying lustre on our profession. I allude, of course, to the noble self-sacrifice of the surgeons who volunteered to attend the sufferers on board the "Eclair," and left not her pestilential deck till two of them, at least, were numbered among the victims of the disease. It is not for me to point out the

peculiar circumstances which distinguish this act of heroism from those which are so proudly recorded on the monuments of men whose boldest deeds lose by comparison; it is not necessary to enlarge on the patient self-denial, the sublime devotion, of men who could offer a promising life to the grasp of death in his most ghastly form, without any of the stimulants of human applause to cheer them on, or to sustain them in the long hours of sleepless exposure to dangers which they could but too well appreciate. But I cannot forbear, in this assembly, to express my surprise, not to say disgust, that while a wreath of immortality is obtained for a few brief hours, or moments it may be, of death-grappling in the times of war, these instances of more deliberate and, therefore, more genuine courage, prompted not by ambition and self-love, but by the purest benevolence and the most exalted sense of professional duty, should pass away unheeded, and soon to be forgotten even by contemporaries.

I trust you will excuse this brief, but I hope not misplaced, digression from the more immediate object of this report, but it struck me that no more fitting opportunity than the present could be found for paying that just tribute of sympathy and admiration to the self-devoting exercise of our profession, which has been denied by a heedless and selfish public. We will now proceed to the consideration of

Puerperal Fever.—The communications upon this fearful malady during the past year have been both numerous and important, and tend in an especial manner to confirm the opinion now predominant, that it is in the highest degree contagious, and is closely allied to, if not actually identical with, erysipelas. In a paper by Dr. Kneeland,* written with the object of establishing its contagious nature, there is contained an accumulation of evidence which defies cavil. It is to be regretted that the great extent of matter to be included in this report prevents my laying this evidence before you *in extenso*, in order that you might share my conviction of its irresistibility, for the question is one of paramount importance, and I fully believe that many a life is sacrificed by a rigid adherence to the opposite opinion. The conclusions of the author are, however, to the effect that this fever may be propagated by

* *American Journal of the Medical Sciences*, January, 1846.

direct inoculation with the fluids of the living or dead; by effluvia; or be communicated by the medical attendant, or by any person or thing which has been in communication with the patient; that the medical attendant is likely to communicate the disease, in proportion to the number of times, or length of time during which he has been in communication with the patient. He further decides, that if a medical man has made, or even been present at, an autopsy of this disease, he ought to take the greatest care to cleanse himself before he attends another labour case; and that if more than one case of puerperal fever should occur in his practice, he ought instantly to cease to attend midwifery during a certain time.

In a second paper,* in which the same author investigates the connection between puerperal fever and epidemic erysipelas, he adduces a general summary of the cases in which the two affections have been observed mutually to give rise one to the other, from which he deduces the general conclusion—"That as they are both diseases which arise in a general diseased condition of the system, and which may attack various internal organs, and thus form non-essential complications to the essential element of the disease; —that as they arise under precisely similar conditions of the atmosphere;—that as on the one hand a person who has been in communication with a case of erysipelas, may communicate puerperal fever to a puerperal patient, and, on the other, a person attending puerperal fever may become the subject of erysipelas;—that the same morbid poison gives rise to the two diseases;" in other words, puerperal fever is often only erysipelas attacking a puerperal woman, presenting the same constitutional symptoms, march and morbid appearances, with a preference for the uterine organs, as might be expected. He gives, likewise, the important caution, that a practitioner should not attend a labour immediately after dressing a case of erysipelas.

The erysipelatous nature of puerperal fever is also maintained by Dr. Blackmore,† Mr. Symonds,‡ Dr. Flint,§ and Dr. Peddie.‖ Dr. Flint adduces a remarkable instance in which, of two ladies

* *American Journal of the Medical Sciences*, April, 1846.

† *Provincial Medical and Surgical Journal*, March, April, and May, 1845.

‡ *Lancet*, May 17, 1845.

§ *New York Journal of Medicine*; in *Medical Times*, Nov. 22, 1845.

‖ *Edinburgh Medical and Surgical Journal*, 1845.

who were in close attendance upon a friend who died of puerperal fever, one died of erysipelas, and the other narrowly escaped with her life, while the woman who washed the linen having received a slight scratch on the hand, was attacked with erysipelatous inflammation of the absorbents, and died after a few days illness.

The essay of Dr. Peddie describes, in graphic terms, the distress of an honourable and humane mind at being the unwitting cause of death to five or six patients consecutively, to whom there can be little doubt he carried the infection. The first three cases failed to arouse his attention to the share he himself had in the propagation of the disease, but the occurrence of a fourth induced him to leave his practice for a fortnight. This lapse of time, however, did not appear to suffice to rid him of the infection, for the first female he attended after his return fell a victim to puerperal fever. In illustration of the connection between this fever and erysipelas, he mentions that at the time the first puerperal case occurred he was in close attendance upon a case of erysipelas, originating in an ill-managed bubo, with sinuses.

Several epidemics of puerperal fever have lately been recorded, the particulars of which I shall proceed to lay before you. Of one of those which has recently appeared in several of the Parisian hospitals, a full account is furnished by MM. Bidault and Arnould.* The symptoms generally declared themselves on the third or fourth day, commencing in every case with rigors, followed by heat of skin, and a pulse ranging from 110 to 120, and of variable strength. The other ordinary symptoms were headache, injection of the eyes, loaded tongue, laborious breathing, pain in the abdominal region, bilious vomiting, and diarrhœa, or obstinate constipation. The lochia were in all cases diminished or suspended, as was likewise the secretion of milk. Under the influence of blood-letting, which was in some cases adopted at the Hôtel-Dieu-Annexe, all the symptoms of re-action subsided, the features became pale and contracted, the eyes sunken, the lips became livid, and the most extreme feeling of anxiety supervened. The abdominal pains were diminished, but the abdomen became so tympanitic as to add considerably to the difficulty of breathing. Death usually occurred before the fifth or sixth day, with every symptom of low typhus. In some cases bronchitis formed a serious complication; in others

* *Gazette Médicale*, and *Encyclographie des Sciences Médicales*, Aôut, 1845.

papular spots, similar to those observed in typhoid fever, made their appearance. The *post-mortem* appearances were as follows:— The uterus was flaccid and voluminous, and lined with fetid and sanious false membranes; the muscular tissues and veins were unaffected, but the lymphatics were distinctly seen to be filled with pus; in some cases the diseased lymphatics were confined to the uterus, but in others, those of the appendages were involved. At the Hôtel-Dieu and the Hôtel-Dieu-Annexe, where symptoms of peritoneal inflammation predominated, alterations of that membrane were found correspondingly frequent. The peritoneal cavity contained a purulent serosity, in which fibrinous flocculi were seen floating. At the Hôpital St. Louis, where the typhoid symptoms were most developed, the peritoneal membrane was unaltered; but there was extensive purulent infiltration of the pelvic cellular tissues. The liver was healthy in all cases, as was likewise the spleen. The lungs exhibited no alterations beyond the hypostatic congestions common to low fevers. There were no purulent deposits; but pus was sometimes found in the pleural cavities. The blood exhibited the dark semi-coagulated appearance seen in typhoid fever. There was no particular lesion of the nervous system.

No appreciable cause for the outbreak of this epidemic could be discovered, either in the state of the atmosphere or other surrounding circumstances. The epidemics, however, all occurred in the cold months. The disease did not appear to originate in over-crowding of the patients, as at St. Louis the number was less than usual. It is, nevertheless, worthy of notice, that of sixty-seven women delivered in the obstetrical ward of the Hôtel-Dieu-Annexe, one in five died; but of twenty-one distributed promiscuously among the female wards, a single case only was lost. This fact, as the reporters justly acknowledge, is an evidence of the impropriety of accumulating patients labouring under this and similar diseases. The disease was thought to be contagious; but no mention is made of the consentaneous appearance of erysipelas. The patients attacked were generally those of feeble constitution, and unable to nurse their infants.

The treatment adopted in these epidemics was, for the most part, unsuccessful. General bleeding was invariably prejudicial; local bleeding, though not productive of injurious effects, appeared

of little use. The author speaks favourably of repeated warm injections, per vaginam, for the purpose of removing the sanious discharges. The patients, two in number, saved by M. Tessier at the Hôtel-Dieu, were treated by leeches and fomentations, followed by mercurial frictions, and the internal exhibition of the tincture of aconite.

Some epidemics, of a similar character, which occurred at Rennes in the years 1842 and 1844, are described by M. Botrel.* As in the disease above-mentioned, the lymphatics were chiefly implicated, for which reason the author called the affection an *angioleucite puerpérale;* the veins were not in any case involved. These epidemics, however, differed from the former in the frequent occurrence of purulent deposits in the lungs. The author believed the disease to depend upon atmospheric causes; but refuses to admit the influence of defective ventilation. The disease terminated with typhoid symptoms, in some cases in forty hours, but generally not before the fifth day. The mortality in the first epidemic was twenty in twenty-four; in the second, twenty in twenty-two. In the cases which recovered, local and general bleeding, purgatives, and mercurials were employed. M. Botrel distinctly states that general bleeding was only admissible in the very outset of the disease. Turpentine was found to be positively injurious.

The particulars of an epidemic which occurred recently in the Maternité of Gratz are also given by Dr. Schoeller.† The chief value of this communication consists in the minuteness with which the pathological appearances are recorded, which, in the majority of cases, were those of purulent infection, originating in uterine phlebitis.

Exanthematic Fevers.—Scarlatina, Incubation of.—The length of time during which the contagious principle of scarlatina may lie dormant is strikingly illustrated in a case related by Dr. Duncome,‡ of the Bahamas, in which it was ascertained by infallible evidence to have been latent for eleven weeks.

Complications.—A case of scarlatina, in the course of which croup arose as a complication, is related by Dr. Kennedy.§ The

* *Archives Générales*, Avril and Mars, 1845.

† *Medicinische Jahrb., der k. k. Oester. Staat.*, October, 1844.

‡ Quoted in *Lancet*, March 21, 1846.

§ *Dublin Medical Press*, March, 25, 1846.

case had all along been of the most unpromising appearance, the eruption being tardy, and accompanied by great vascular congestion and collapse. After the eruption had declined an abscess formed in the cervical fascia, and subsequently symptoms of croup declared themselves. From these the child recovered, but he sank eventually from irritative fever. After death an extensive abscess was discovered behind the pharynx. The author denies that the croupy symptoms were connected with the abscess, but as the larynx and trachea were perfectly healthy, that would appear to have been more than probable.

The occasional occurrence of pericarditis as a complication of scarlatina, mentioned by Dr. Burrows, Dr. Robert Willis, and others, is confirmed by the observations of Dr. Scott Alison.* There does not appear to be any peculiarity in the type of the fever upon which this local affection supervenes; nor can anything positive be said as to the exact period of its accession, as the author's experience appears to have, at the time of his communication, been limited to three cases. In one of these cases the heart-affection appeared on the decline of the eruption; in another, during its persistence. The cause of the inflammation is properly supposed by the author to depend upon the presence of crystallizable compounds in the blood, which should have been eliminated from the kidneys.

Schönlein† notices a peculiar phenomenon occurring in the convalescent stage of scarlet fever, which is worthy of notice. This consists in an exfoliation of the urinary epithelium, analogous to that which takes place in the external integument. The urine in this condition of things exhibits a mucous deposit, which may be seen by the microscope to consist almost entirely of epithelium scales. Schönlein is of opinion that the exfoliation is the predisposing cause of the scarlatinous dropsy, and for this reason does not pronounce the patient safe until not only the cutaneous but the urinary desquamation also has ceased.

A brochure has been recently published by Mr. Isaac Browne,‡ for the purpose of recommending the use of distilled vinegar, in drachm doses, in the treatment of this disease. Independently of the beneficial effects attributed to it during the progress of the

* *Medical Gazette*, February, 1845.

† Quoted in *Medical Gazette*, March, 1846.

‡ "On Scarlatina," &c., London, 1846.

disease, this medicine is supposed by the author to prevent the subsequent anasarca, as he states that since he has adopted the specified plan he has never met with an instance of this sequela. Similar testimony is also afforded by Mr. Hunter, of Margate.

Another element in Mr. Browne's method of managing scarlet fever, and one which strikes us as of more importance than the acid, is his practice of applying a strong solution of nitrate of silver to the tonsils as soon as ulceration, or even redness, displays itself, by which he is enabled to check in limine one of the most dangerous complications of the disease. The same proceeding is strongly recommended by Dr. Chapman* and Velpeau, although both give the preference to the application of burnt alum in powder.

Measles.—In a clinical lecture upon the exanthematous fevers Chomel† asserts, that in certain cases in which it may be difficult to determine whether the eruption be rubeolar or scarlatinous, the doubt may always be dissipated by an examination of the sputa, which in measles are nummular, and resemble the expectoration in phthisis, with the exception that in this latter disease the sputa float in a thick mucous fluid, while in measles that fluid is colourless and transparent. In scarlatina no such character of the expectoration is observable.

An unusually severe epidemic of measles occurred in the South Dublin Union Workhouse at the close of the past year, and is described by Dr. Battersby. This epidemic was remarkable for the frequent supervention of various untoward complications, the principal of which was a diphtheritic inflammation of the fauces, mouth, and larynx, accompanied by pneumonia, which latter affection was, in the majority of cases, the cause of death. In another class of cases, a severe diarrhœa, with bloody stools, frequently appeared during the decline of the eruption.

Intermittent and Remittent Fevers.—The most recent information in connection with paludal fevers has reference to the mode of exhibiting quinine in their treatment.‡ The common practice in

* "Lectures on Eruptive Diseases," Philadelphia, 1845.

† *Gazette Médicale*, Mars, 1846.

‡ See *Half-Yearly Abstract*, vol. iii., Art. 2 and 3; *Boston Medical and Surgical Journal*, July 23, 1845; *American Journal of the Medical Sciences*, October, 1845; *Boston Medical and Surgical Journal*, July 9, 1845.

this country is to give the remedy in small repeated doses, of from two to four grains, during the intermission; and its exhibition during the paroxysm has by many been thought hazardous. It appears, however, from the evidence afforded by the experiments of American and Italian writers, not only that large doses are more efficacious and economical, but that they may be given during the fit with perfect safety. In regard to remittent fever, the testimony of Drs. Upshur, Byrne, and Van Buren is particularly strong. The practice of Dr. Upshur is to exhibit quinine in the paroxysm, irrespective of quantity, until the patient complains of *noises* and *buzzings* in the ears, which symptoms he regards as indicative of the entire subjection of the system to the influence of the remedy. He further states that he has never lost a patient when these effects have been produced by a moderate quantity of the medicine; but that where unusually large doses fail to induce them, the case generally proves fatal. The author's practice is to give it in ten-grain doses every hour until the above-mentioned symptoms supervene.

Dr. Byrne, in reference to the use of quinine in remittent fever, expresses his regret that he had often suffered the patient to be worn down by repeated paroxysms rather than have recourse to quinine, because no decided intermission could be obtained. He subsequently found that quinine might be exhibited with the greatest advantage even in the hot stage. As regards the dose, this writer observes, that in remittents of ordinary severity, it is a matter of indifference what dose is employed, provided that ten or twenty grains are introduced into the system within a certain number of hours before the expected exacerbation; but in the severer forms of fever he considers the dose is no longer a matter of choice, but that the quantity above specified should be given in one or two doses at the utmost.

Van Buren exhibits from twenty to twenty-five grains at a dose, as soon as the skin becomes moist, and repeats it at the end of from four to eight hours.

In the treatment of intermittent fever, the advantage of decided doses of quinine is equally evident. Upshur gives it in five-grain doses every two hours, until noises in the ears supervene. Van Buren exhibits fifteen or twenty grains from six to twelve hours before the chill is expected. In about two-thirds of the cases thus

treated he found it unnecessary to repeat the dose, and he is unable to remember an instance in which he was obliged to exhibit a third dose.

Dr. Graves* advises a single large dose at the commencement of a fit, and then to suspend it until the occurrence of another. He believes that if it be given while the fits are off, its curative effects are diminished, and the system becomes as it were so accustomed to it, that when the disease again requires it, it no longer exerts its anti-periodic agency.

Lest it should be supposed that these large doses of quinine may be productive of mischief, it may be mentioned that Van Buren states that he has never witnessed any ill effects from them, but has found the unpleasant consequences attributed to quinine as readily produced by two grains as by scruple doses. Similar testimony is given by Dr. Byrne, Dr. Satterlee and Dr. Porter.

Nitrate of Potash in Intermittents.—M. Briquet† has recently published the results of some trials made with the nitrate of potash in the intermittents of the past year. Guided by some experimental researches, from which it resulted that the nitrate of potash, when injected into the veins of animals, produced on the circulation and on the whole economy, effects similar to those produced by cyanhydric acid, arseniate of potass, sulphate of quinine, cinchonine, and the other febrifuges introduced into the blood in like manner, M. Briquet thought it probable that nitre, which was also found to exert an influence in a high degree on the heart and on the nervous system, corresponding to that which experiment had proved to exist, in a marked manner, in all febrifuge substances, was, in like manner, endowed with antiperiodic properties to a degree sufficient to arrest the paroxysms of intermittent fevers. This analogy seemed to be confirmed by the identity of the symptoms which followed the exhibition of the sulphate of quinine, and the nitrate of potass, in over-doses.

Such were the grounds on which M. Briquet was induced to examine the powers of nitrate of potass as a febrifuge. The following are the results at which he has arrived:—In three cases the paroxysms completely ceased after the first dose of the medicine. In two cases the paroxysms yielded gradually. In one case only

* *Dublin Quarterly Journal*, February, 1846.

† *Gazette Médicale*, and *Provincial Medical and Surgical Journal*, April 1, 1846.

was there a relapse. The dose of the nitrate employed was from four to six and eight grammes (one to two drachms,) in the day. In one patient it was gradually carried up as high as twenty-four grammes, increasing it from one to two grammes daily. It was given either in powder or unfermented bread, or dissolved in mucilaginous julep, during the six hours which followed the close of a paroxysm.

Relapse Periods.—Dr. Graves believes that he has discovered that the law which regulates the periodicity of intermittent fevers does not apply to the succession of paroxysms alone, but is extended to the free intervals between them. He was led to the observation of this law from watching a quartan ague of unusual obstinacy, which recurred at various lengthened periods, after having been apparently cured. It was ascertained, by a careful examination of dates, that on several occasions the paroxysms renewed themselves after an interval of several weeks, at precisely the day and hour at which the fit would have been due had the disease progressed uninterruptedly. This fact, if it be one of general application, is a curious exemplification of the tenacity with which the conditions of periodicity lay hold upon the system.

Inversion of the Stages.—An apparently well-authenticated case of ague, in which the stages were completely inverted, is related by M. Maugenet.* The patient upon each accession of the fit was first attacked with profuse sweating, which lasted for an hour; the skin then became dry and hot, and the face flushed, with headache, &c. This stage lasted ordinarily for five hours, when the patient began to feel cold, and eventually had distinct rigors. This remarkable case was cured by quinine, with the same facility as in the more regular form.

Syphilis.—During the last few weeks a matter of the utmost consequence in relation to the well-being of society, has been propounded in the question, whether secondary syphilis is, or is not, communicable? This question, which has generally, from the inefficacy of inoculation and the results of general observation, been decided in the negative, has of late given rise to considerable discussion, by the occurrence of cases in which the disease has been supposed to have been communicated to the nurse by a

* *Revue Médicale*, Mars, 1846.

contaminated infant. As the question is still looked upon as requiring to be elucidated by the evidence of careful observation of facts, of which, from the shortness of time which has elapsed, but few have as yet been elicited, we can do no more thus cursorily call for attention to the subject.

SECTION III.—ACCIDENTAL PRODUCTIONS.

Accidental Productions in general.—M. Baron,* in continuing his researches upon the nature and mode of development of the various heterologous formations to which the human body is subject, has arrived at the conclusion that they have all an identical origin. The reasons upon which he founds this proposition are, the frequent similarity of anormal tissues; the mutual transformations which they undergo; their simultaneous appearance, analogy of structure and development; their analogy of seat; the similarity of symptoms, progress, and termination of the diseases to which they severally give rise; and, lastly, their identity in chemical composition. In seeking to establish the proximate cause of the various forms of accidental tissue, M. Baron differs both with Trousseau and others, who attribute them to a low form of inflammation, and also with Cruveilhier, who considers them to arise in a phlebitis of the part in which they are seen. The opinion to which he leans is that which has long been maintained by Andral in respect of tubercle, that they originate in a perverted action of ordinary nutrition, by which, instead of the development of a normal cell, one is formed which is disposed to go through the various phases of diseased development seen to exist in the different varieties of accidental tissue. The diseased cell is considered by the author to be in the initiatory stage identical in every species of morbid development, whether it be cancer, melanosis, tubercle, false membrane, or hydatids. What the principle is which impresses upon the cell the peculiar characteristics of the individual structure to which it is destined to give rise, the author does not pretend to decide. The remote cause of every accidental formation is attributed to some inappreciable modification of one or more of the constituents of the blood.

* *Gazette Médicale*, Mars, 1845.

Cancer.—Among the recent acquisitions to our knowledge of the pathology of cancer, there can be no difficulty in according the first place to the admirable monograph of Dr. Walshe,* a work which may safely be pronounced to be the very best upon the subject in our own, if not in any language, Dr. Walshe defines cancer to be an infiltrating growth, occupying a certain position among "blastemal formations," by the term "blastema" being understood the fluid in which cells are generated, destined either to add to the natural growth of parts or to form abnormal products. The peculiarity of the cancer-cell consists in its tendency to infiltrate surrounding tissues, and to convert them into a structure analogous to its own.

The most interesting chapter in the volume is that containing the origin, growth, and properties of the cancer-cell. This cell is developed, according to Dr. Walshe, by a process analogous to that of exudation, and in a blastema which does not present any sensible differences from that in which the normal cell existences originate. The cell when formed may germinate in three localities; in the interior of vessels, in the substance of vascular walls, and in the inter-vascular spaces. Many authors include the blood itself in the list; but Dr. Walshe refuses to admit that cancer-matter is ever primarily developed in that fluid.

The anatomical elements of cancer are shown to be principally granules, nucleated cells of varied forms, free nuclei, and a fibrillar substance associated with a fluid blastema. Each of these elements is minutely described, but we shall only allude to those remarks which have the aspect of the greatest originality. In speaking of the cells, the value of the caudate cell as diagnostic of malignant structure, is placed in a very different light to that in which it has usually been regarded. The author explains satisfactorily, that there is no essential difference between the caudate and the spherical cell, excepting in the accidental circumstance of shape, which is regulated solely by the degree of compression to which the individual cells have been subjected; he therefore concludes that the importance of these cells has been greatly over-rated. An appearance more truly characteristic of the cancer-cell appears to be the presence of an opaque body in its walls, called by Dr. Walshe the parietal nucleus.

* *Nature and Treatment of Cancer*, London, 1846.

The blood-vessels of cancer are stated to be of two classes, one which originates *de novo*, and the contained blood of which exhibits an independent oscillatory movement; the other, formed by the ordinary mode of extension of the adjacent vessels. Both sets eventually inosculate.

As the author admits of no difference between the blastema of cancer and ordinary exudation, the evolution of the cancer-cell is supposed to be identical with that of ordinary nutrition. The exact mode of formation is as doubtful in the one as in the other. Dr. Walshe believes that the formation of the enveloping cell precedes that of the nucleus.

The cell once formed, the author next considers its mode of increase. This, he states, takes place in one of two ways; either by endogenous generation, or the development of one cell within another, or by the secondary cell being formed external to the preceding ones. Both of these modes of growth may coexist in the same tumour.

The two succeeding chapters are occupied with the changes produced in the surrounding tissues by the presence of cancer, and with the general pathology of the formation. The latter, in particular, is a most important chapter.

The treatment of cancer will not long detain us, as the surgical part of the curative measures may, of course, be passed over as not belonging to the present Address. The internal exhibition of medicines holds out but little encouragement. Among these *conium* has failed in the author's hands to do more than alleviate pain, and the same may be said of other narcotics, as *belladonna, aconite,* &c. The only medicine from which he has derived real benefit is the *iodide of arsenic.* With this, in conjunction with compression, he considers that there is the greatest chance of success. It may be given with safety in doses of one-twelfth of a grain, and continued for several months, if the precaution be taken to exhibit it about two hours after eating.

Some observations on the microscopic anatomy of cancer are to be found in the *Medical Gazette,** extracted from a recent work by Vogel. They do not, however, afford us any very definite information. The main point which they tend to establish is that the caudate cell, as asserted by Dr. Walshe, is not diagnostic of cancer-matter.

* September, 1845.

The frequency with which cancer displays itself in the two sexes, and at different ages, is investigated in a short communication by Mr. Wilkinson King,* being the result of *post-mortem* examinations made at Guy's Hospital. Mr. King finds that half of the number of females dying at or about the age of forty-four years, are the subjects of cancerous formations; of males dying at the same age, one-eighth only are similarly affected.

Tubercle.—The natural history of tubercle is a subject of the deepest interest, both to the philanthropist and the medical philosopher, and therefore rarely fails to afford materials for retrospection in these Addresses. It so happens, however, that the communications which it is my province to notice on the present occasion, do not announce any views which can be said to form a nearer approach to a correct appreciation of the mysterious process of tuberculization than we have already attained, though many of them are valuable as containing the results of original investigations, both chemical and microscopical. I shall not, therefore, lay before you a detailed examination of these various essays, but content myself with, to you, the less tedious plan of giving you references to the sources in which they may be found.

The general doctrines of tuberculization, and the minute anatomy of tubercle, will be found well enunciated in Lebert's† elaborate work on general pathology, and still more recently by Günsburg.‡ An excellent description of pulmonary tubercle appears in *Hasse's Pathological Anatomy.*§ Dr. John Hughes Bennett || has also published an essay on the "Minute Structure and Chemical Composition of Tubercle," and others are also furnished by Cless,¶ Engel,* and Hamernjk,† in all of which the matter is treated with the minuteness and industry for which the Germans are so notorious. Rochoux has contributed a paper, published in the *Archives Générales,*‡ and, lastly, Zehetmayer §

* *Medical Gazette*, August, 1845.
† *Physiologie Pathologique*, tome i., p. 350.
‡ *Die Pathologische Geweblehre;* Leipsig, 1845.
§ Published by the Sydenham Society, 1846.
|| *Northern Journal*, April and May, 1846.
¶ *Schmidt Jahrb.*, heft ii., 1845, and *Half-Yearly Abstract*, vol. ii., p. 57.
* *Ibid*, heft iii., bd., 45, 1845.
† "Zur Pathologie und Diagnosis der Tuberculosis," *ibid*, bd. 46, No. 3, 1845.
‡ Mars, 1845.
§ *Zeitsch. der k. k. Gesellst. der Aerzte zu Wien.*

one, in which he strongly maintains the inflammatory origin of the deposit.

Typhus Material.—It is a favourite theory with the German physicians, that during the progress of typhus fever, a certain morbid material, said by Rokitansky to resemble that of medullary sarcoma, is poured out from the blood into the texture of various organs. Vogel,* among others, has paid much attention to the point, and has published observations, some of which have recently been translated by Mr. Kirkes. It would seem that the parts most liable to become the seat of the above-mentioned material are the mucous membranes, but it may also appear in the substance of the denser organs. The action which precedes the deposition of the typhus material is said to be inflammatory, and to affect especially the solitary and aggregate glands of the small intestines. The most important transformation undergone by the typhus material after its deposition is that of its conversion into a brownish slough, which upon separation leaves the typhus ulcer. The material examined by the microscope is seen, according to Vogel, to consist of an amorphous granular product of a brownish white colour, and containing cells of $\frac{1}{300}$th of a line diameter, some nucleated.

The subject of the typhus material has also been taken up by Engel and by Günsburg. Engel has observed it under two forms, a fluid and a solid, usually combined; the fluid matter is viscid and opake, and when allowed to rest throws down an abundant sediment of epithelial cells and phosphate crystals; the solid matter, as observed by Vogel and Rokitansky, is chiefly found in the intestinal follicles. The process of ulceration and reparation are faithfully described by Engel, as well as certain anomalies to which the diseased product is occasionally subjected.

Günsburg describes the typhus infiltration as consisting of remarkably small transparent cells, without nuclei, but containing diminutive corpuscles. It is deposited in the submucous tissue of the intestines in the neighbourhood of the glands, the mucous membrane in the first instance being intact. The part in which the deposit is most abundant is usually the convex portion of the ileum, and especially that part of it which forms the cæcum. The

* *Erläuterungstafeln zur pathologischen Histologie;* in the *Medical Gazette*, October 31.

material continues to be deposited in successive layers until at length the mucous membrane covering it is absorbed, and the typhus ulcer then appears.

Entozoa.—Some very interesting remarks upon the natural history and pathological relations of the class of parasitic animals occur in a lately published work by Klencke,* a concise analysis of which is to be found in the *British and Foreign Medical Review.* The main object of the communication appears to be to declare the result of experiments by inoculation of the germs of different forms of hydatids, by which he appears to have fully succeeded in engrafting the parasitic animal. With respect to the order of intestinal worms, the author conceives that the ova are deposited with the fæces, and are hatched externally to the body, as he has frequently discovered the embryos of the species which are known to infest the human race in the water of ditches. He entertains certain fanciful notions concerning the manner in which these embryos gain admission into the human body, but excludes from his consideration the very obvious way of ingestion with the food or drink.

Effect of Disease upon Animal Temperature.—Although the records of medical science afford many isolated groups of experiments upon this subject, a well-digested, and at the same time extensive series of observations is still a desideratum. An approach to the fulfilment of the latter part of this want has been made by my colleague, Dr. Hake,† who has published thermometrical observations connected with the disease in the adult: these are at present, however, unavailable as a means of diagnosis, no attempt at generalization as yet having been made. The most complete example of this kind of investigation is that of M. Roger, consisting of a careful study of the effects of disease on the temperature of children, the results of which may be thus briefly recapitulated:—

In *intermittent fevers* he has had but little experience, as that form of disease rarely attacks patients at the age of those who were submitted to his examination.

* *Impversuche und natur-historisch pathologische Untersuchungen zur Erforschung der Helminthiasis als Contagium;* reviewed in *British and Foreign Medical Review,* October, 1845.

† *Medical Gazette,* November, 1845.

Typhus fever is one of the diseases of infancy, in which the elevation of temperature is most considerable and the most continuous. In fourteen cases out of twenty-three the heat passed 40° Cent. A remarkable fact ascertained by the observer was, that in this disease there was no proportion between the elevation of the temperature and the excitement of the pulse.

In the *eruptive fevers* the rise of temperature was most marked in scarlatina, then in small-pox, and next in measles. In small-pox the temperature reaches its maximum at the commencement of the eruption, then diminishes, but again rises at the period of the suppurative fever. The author agrees with Currie, that the temperature rises higher in scarlatina than in any known disease. In measles the heat is greatest at the outset of the eruption, after which it gradually subsides.

The diseases of the organs of *circulation* being rare in children, are not noticed.

Diseases of the *digestive* organs, with the exception of acute peritonitis, add but little to the temperature of the body.

In *meningitis* the results of thermometric examination are variable; in some cases the augmentation was trifling, in others M. Roger found it reaeh 42° Cent. One circumstance constantly noticed in this disease, was a period of diminution of heat, intermediate between two periods of increase.

In disease of the *respiratory organs* the temperature rose in proportion as the parenchyma of the lungs became involved. Thus in croup it was 38° 25″; in bronchitis, 38° 31′; in acute pleurisy, 39°; in pneumonia, almost always as high as 40°. In this disease there is always a correspondence between the temperature, pulse, and respiration. In acute phthisis the temperature was augmented, but in chronic phthisis it remained natural.

In *anæmia* and *rachitis* the author found the temperature normal. In *œdema neonatorum* the heat was found to be below the natural standard, being 31° in the mean of 52 cases; in seven it fell as low as 26°, and in two others to 22°, being 15° below the natural point.

These observations would have little value in themselves, had not the author invested them with great interest by the care with which he has made them subservient to the diagnosis of infantile disease. In this respect he places far more confidence in the

elevation of temperature than in the state of the pulse; excitement of the latter may take place without the existence of any disease; the former is, he observes, always indicative of more or less disturbance. But in order to appreciate the value of increased heat of body, it is not sufficient to have regard to that sign *per se;* it must be taken in conjunction with other symptoms. Thus typhus fever is the only infantile disease in which a greatly elevated temperature is associated with a moderate range of pulse, so that, according to Roger, typhus fever may be diagnosticated to a certainty in a child when the temperature is 40° Cent. or upwards, and the pulse at the same time under 100.

In this manner also, continues the author, meningitis may be distinguished from typhoid fever with cerebral disturbance. If the temperature be elevated and persistent, and the pulse not more than 100, it is probable that typhoid fever exists; if with the same temperature, the pulse reaches 130, there is reason to suspect meningitis.

These remarks may suffice to give you an idea of the researches of M. Roger and his method of applying them to practice. To give an opinion either favourable to or against their truth would be premature, but there is, I believe, sufficient *primâ facie* evidence in their favour to warrant their being received with some degree of attention.

This concludes what I have to say upon the subject of general pathology. We shall proceed now to pass in review the additions which have been made to our information upon the various individual diseases of the different regions of the body, and in doing so I shall adopt the classification which I have elsewhere made use of, dividing diseases into groups according to the important function to which the organ affected may be subservient. We shall commence with diseases of the nervous system.

PART II.—SPECIAL PATHOLOGY.

SECTION I.—DISEASES OF THE NERVOUS SYSTEM.

There is no department of pathological inquiry in which the proverbial uncertainty of the basis of our reasonings is more frequently manifested than in that of the diseases of the nervous system, and more particularly of that part of it contained within the

solid walls of the cranium. The obscurity attending these diseases is doubtless due, not so much to any intrinsic intricacy appertaining to them, as to a want of certain information respecting the physical conditions of the brain. This uncertainty is made more palpable at the present time by the publication of a work by Dr. Burrows,* which tends at once to annihilate all the theories of cerebral disease in which for some years past we have been accustomed to indulge.

There are few, probably, here present whose notions of the nature and treatment of diseases of the brain have not been more or less influenced by the attractive hypothesis first promulgated by Dr. Alexander Monro, and afterwards maintained by Drs. Abercrombie and Kellie, that the cranium being a perfect sphere, resisting atmospheric pressure, and containing a nearly incompressible organ, the quantity of blood circulating within it could never undergo any material change. Most of us, perhaps, have been in the habit of taking it for granted, even in the teeth of every-day experience, that determination of blood to the head was an ingenious fiction; that bleed a man to what extent you would, you could not derive one drop from the brain, and that whether a man were hanged by the neck or the heels, it still made no difference in the fullness or emptiness of the cerebral vessels.

It needs but a careful perusal of Dr. Burrows' clever work at once to dissipate these cherished ideas, for a re-performance by the author of the self-same experiments propounded by Dr. Kellie have led to diametrically opposite results. I cannot find space to detail these experiments, but they justly entitle us to believe, with Dr. Burrows, that removing blood from the general system does affect the quantity of blood in the brain; that there may be a plethora and an anæmia of the brain as of the other organs, though not to the same amount perhaps, and that the quantity of blood in the brain is influenced by posture.

Having stated his opinions upon the fallacy of Dr. Kellie's conclusions, Dr. Burrows next discusses a subject of great importance in cerebral pathology, namely the effect of vascular pressure upon the nervous matter. He shows that a constant source of pressure exists in the momentum of the blood, distending the

* *On Disorders of the Cerebral Circulation and their connection with Diseases of the Heart;* London. 1846.

arteries and veins whieh ramify in the substance of the brain and its membranes, and that this pressure must in the brain be exerted with full foree, beeause from the undilateable nature of the eranium its eontents cannot expand *en masse*, as in the case of other vascular organs. That injurious effeets do not more eonstantly follow the necessary variation of this pressure in a state of health, is aeeounted for in two ways,—by the great development of the venous system within the eranium and spinal eanal, whieh affords a ready exit for the redundant blood, and, in the second plaee, by a natural eontrivance not suffieiently insisted upon by anatomists, namely, the existence of a eerebro-spinal fluid. This fluid is shown to play a most important part under every eondition of the brain, both physiological and pathologieal, as by its eapability of oscillation between the ventrieles of the brain and the spinal eanal, it is peeuliarly fitted to compensate for any variation in the quantity or tension of the eirculating fluids of the brain. When by inereased aetion of the heart more blood than eommon is thrown upon the cerebral vessels, the eerebro-spinal fluid subsides into the spinal eanal, and injurious pressure upon the cerebral pulp is thus, within eertain limits, averted; and, on the other hand, if less blood than usual passes into the brain, the fluid rises into the eranium, and the equilibrium of tension is preserved. Upon this prineiple of vascular pressure, the author of the work before us explains many of the symptoms of cerebral disease generally attributed to other causes; for instanee, apoplectie eoma is supposed to depend not upon the direct pressure of the clot, but upon the assoeiated inerease of vaseular tension of the cerebral vessels, whieh, as there is an extraneous quantity of matter in the eranium, eannot be wholly eompensated for by the deseent of the eerebro-spinal fluid. The symptoms of anæmia, likewise, are said not to be due either to want of balanee between the eireulation in the arteries and veins as is generally taught, nor to a defieient supply of blood to the brain, but to a loss of tensive equilibrium. The same with regard to fainting.

Effects of Obliteration of the Carotid Arteries upon the Cerebral Functions.—The effeets of unequal or diminished tension of the cerebral vessels, are strikingly shown when the eurrent of blood towards the brain is obstructed by aeidental or intentional

obliteration of one or both carotid arteries. Cases are on record in which the simultaneous closure of both vessels has been followed by death within twenty-four hours; and ligature of one, though not so rapidly fatal, frequently proves so by its secondary effects. In a carefully compiled essay by Dr. Chevers,* fourteen cases are given, in which one carotid artery was rendered impervious either by disease or by operation; in eleven of these death ensued generally from softening of the brain, with paralysis of the opposite side of the body. Dr. Burrows† refers the symptoms in these cases to two causes,—partly to diminished supply of blood to the hemisphere implicated, and partly to its compression by the opposite side, which receives an abnormal supply of blood as soon as the counter-distention is removed. He attributes the success in fortunate cases of ligature of the carotid to the loss of blood prior to the application of the ligature, by which the momentum of the blood in the brain is diminished, if not obviated.‡

Meningitis—Epidemic occurrence of.—Several cases have recently been recorded by Dr. Darby,§ which appear to have been instances of meningitis, and bear considerable resemblance to a remarkable epidemic described by Rollet and Dr. Gilkrest, as it occurred at Versailles and Gibraltar respectively. The appearances discovered on dissection were patches of lymph on various parts of the arachnoid, with sero-purulent matter at the base. The cases which recovered were apparently saved by depletion, with active mercurial purgatives.

Diagnosis of Meningitis.—Trousseau‖ alludes to two symptoms which are capable of affording material assistance in the diagnosis of meningeal inflammation in the young subject; one is a peculiar suspirious breathing, which has also been noticed by Dr. Willshire,¶ and the other the production of a redness of the skin on the

* *Medical Gazette*, October, 31, 1845.

† *Op cit.*, p. 76.

‡ For a detail of cases in which hemiplegia has followed spontaneous obstruction of the carotid, we may refer to a case of dissecting aneurism of the aorta by Dr. Todd; *Medico-Chirurgical Transactions*, vol. xxvii.; and to two cases by Hasse, in *Henle and Pfeufer's Zeitschr.*, iv. i., 1846; and *Half-Yearly Abstract*, vol. iii., p. 177.

§ *Dublin Journal*, April 1, 1846.

‖ Clinical Lectures, reported in *Medical Times*, April 25, 1846.

¶ *Lancet*, April 25, 1846.

slightest friction. The character of the respiration is striking; the child takes a long breath, and then remains without breathing for a period of ten to fifty seconds, which interval is then followed by another deep sighing inspiration. The cutaneous phenomenon exhibits itself several days before death, and is important, as it may lead to the correct diagnosis of meningitis, at a time when the nature of the disease is not sufficiently indicated by other symptoms. This redness is so easily made to appear that the slightest pressure of the finger is sufficient to produce it. It does not seem to be connected with the state of fever, as many children with high febrile symptoms did not present it. M. Trousseau affirms that he has found it constantly in every case of meningitis which has been presented to him for some time past.

Tubercular Disease of the Brain.—The liability of children of the scrofulous habit to the deposition of tubercular matter in the brain and its membranes, and the great obscurity which still envelopes its production, renders the study of the disease one of the highest interest. We are, therefore, indebted to Mr. Adams for a pamphlet in which the subject is exceedingly well described, both in respect to our general acquaintance with its phenomena, and in reference to his own individual experience.

In his examination of the disease, the author has tabulated and analyzed as large a number of well-authenticated cases as he has been able to collect, amounting in all to 171. In speaking of the diagnosis of the disease, he remarks that a principal element is the presence of the scrofulous diathesis. The age stated to be most amenable to it is that between three and ten years; sex has little or no influence. The symptoms are far from being proportionate to the amount of deposit; as tumours of large size often exist for an indefinite time without giving rise to symptoms of cerebral disorder. Headache is generally allowed to be one of the most constant symptoms, and is of a paroxysmal character, and greatly aggravated by vomiting or respiratory disturbance. Of the other symptoms, convulsions are next in frequency, and are often accompanied by muscular tremors and weakness of the limbs, in some cases almost amounting to paralysis. The intelligence of the child is seldom much affected, and the case will often proceed to the end without any aberration of mind. The author agrees

with preceding writers as to the variability of the pulse, and its rapid changes from 140 to 60 or 70. The breathing is irregular, and a movement of the lips as in taking food is said to be very characteristic. The treatment advised by the author does not require particular mention.

In an essay upon general tuberculization, Hamernjk* has introduced some remarks upon tubercle of the brain, but they are unimportant.

Acute Hydrocephalus is so nearly allied in symptoms and termination to the last-mentioned disease, that it may with propriety form our next subject of comment. There are many pathologists, indeed, who look upon hydrocephalus as no more nor less than tubercular meningitis, and the great frequency with which the disease occurs in scrofulous children certainly gives some countenance to the idea. Rilliet† has decidedly expressed himself of this opinion, and attributes the premonitory symptoms of the disease, referred by Cheyne to abdominal irritation, and by Gölis to cerebral congestion, solely to a general process of tuberculization, which eventually terminates in localizing itself in the brain or its membranes. He, therefore, in accordance with this opinion, regards any treatment specially directed towards the head in the early stages as useless, but relies entirely at this period upon the hygienic and medicinal treament suitable to the tubercular diathesis. His chief remedies are cod-liver oil and lactate of iron.

Dr. Stöben, of Strasburg, has remarked a peculiar alteration of the cornea in several cases of acute hydrocephalus shortly before death. It consists in a semi-lunar yellow speck, situated at its lower margin, and unaccompanied by undue vascularity of the conjunctiva. If the case was protracted, ulceration ensued. Dr. Stöben looks upon the appearance as a low form of inflammation, arising from debility.

Iodine in the stage of effusion.—Two or three cases have lately been recorded, in which the most beneficial effects followed the internal and external use of iodine in the most hopeless stage of this disease. Mr. Ray,‡ of Sheffield, relates two instances in which

* *Schmidt's Jahrb.; Half-Yearly Abstract*, vol. iii.

† *Gazette Médicale*, No. 1 and 2, 1846.

‡ *Provincial Medical and Surgical Journnl*, December 10, 1845.

the patient was saved by painting the head with a concentrated solution of iodine every six hours, after every unequivocal sign of effusion had existed for some time. Similar success followed the internal exhibition of iodine; and friction, with iodine ointment, in the hands of Dr. Christien.*

Apoplexy.—Blood-letting.—In speaking of the therapeutic value of blood-letting in the apoplectic seizure and the indications for its performance, Dr. Burrows† insists strongly upon the precaution, not sufficiently attended to, of examining into the state of the heart previous to determining upon its propriety. If no disease exists in that organ, or there is only slight hypertrophy without vascular disease, then, he observes, it will be safe to bleed as freely as the cerebral symptoms may seem to demand. But if, on the other hand, there be any valvular disease of the heart, and especially regurgitant disease, greater caution will be necessary, the pulse in such cases being a deceptive criterion of the powers of the system. We may add that the whole of this author's remarks upon the connection of heart-disease with diseases of the brain are extremely judicious, and well worthy our most attentive consideration, for it is probable that the great difference of opinion which exists as to the efficacy of depletion in apoplexy, is partly due to a want of discrimination as respects the state of the heart in the cases in which blood-letting is practised.

Mr. Copeman‡ has endeavoured to establish, by statistical inquiry, that the routine practice of using the lancet, as a matter of course, (fortunately not so common an event in the present higher state of medical education,) in apoplectic cases has no sanction in the results of the practice. He adduces a list of 155 cases, in which the treatment is specified. Of these 129 were bled, and only twenty-six were not; of the 129 who were bled, fifty-one recovered and seventy-eight died; the cures, therefore, were one in two and a-half, the deaths one in one and two-thirds; while in those not bled, the deaths were only one in three and a quarter: the cures one in one and a-half. It cannot be denied that many of the cases from which these figures are evolved are

* *Journal für Kinderkrankheiten*, and *Dublin Hospital Gazette*, Dec. 1, 1845.

† *Op. cit.*

‡ "On Apoplexy," London, 8vo., 1845; *Medical Gazette*, March, 1846.

not the most fitted for the purpose, and that no just estimate of the value of any remedy can be formed unless the individual circumstances under which that remedy is applied in every case be taken into account; while, therefore, we should receive Mr. Copeman's deductions with caution, we are still bound to state that a perusal of his work leaves an impression upon the mind that blood-letting is, at least, not of such general advantage as to warrant the unreflecting employment of it which is so often witnessed.

Apoplexy, Meningeal.—In connection with the subject of apoplexy we may mention a paper published by Mr. Hewett in the *Transactions of the Royal Medico-Chirurgical Society,** upon extravasations of blood within the cavity of the arachnoid membrane. The author distributes these effusions into four principal groups: the first, consisting of those in which the blood is either liquid or coagulated, in the latter case being spread out in the form of a membranous layer; second, those in which the extravasation presents itself in the shape of a false membrane; third, those in which the blood is enclosed in a sac, having every appearance of a serous membrane; and fourth, those in which the blood is enclosed in a complete cyst. In speaking of the source of the hæmorrhage, Mr. Hewett holds the opinion, that it may in many cases depend upon "exhalation;" but he qualifies that term by designating by it cases in which the bleeding vessels are so small as to escape detection; he does not appear to believe in "exhalation" in its strict sense. Meningeal extravasations are said by him to be generally met with in cases in which there has been great determination of blood to the head, as in drunkards, in maniacal patients, in the delirium accompanying phthisis, and in aged people, in whom the arteries of the brain are frequently affected by atheroma.

The symptoms of meningeal apoplexy vary according to the site and quantity of the extravasation. One circumstance noticed by Mr. Hewett as not uncommon is a marked intermission in the coma, a fact which bears out the opinion of Dr. Burrows, that coma is not produced by the direct pressure of the foreign body on the brain, but by the pressure caused by the superadded vascular congestion.

* Vol. x., Second Series.

Delirium Tremens.—Dr. Williams deprecates the idea too prevalent in the profession, that in order to cure delirium tremens, all that is necessary is to exhibit opium boldly, and without reference to the dose so long as its specific effects fail of being attained. He remarks, that although there can be no doubt that sedatives are of immense importance in this disease, yet that it must not be forgotten that the patient is not only labouring under high excitability of the nervous system, but likewise under a corresponding depression of the other powers depending upon a lesion of the nutritive functions. For this reason he justly considers nourishment and stimulus as equally necessary with opium.

Mr. Prankerd,* of Taunton, being dissatisfied with the results of the opium treatment, has had recourse to repeated doses of croton oil, from which he states that he has derived the best effects. He gives the details of five cases, two of which, being treated by large doses of opium, died; in the third and fourth opium was also administered, but without benefit, when croton oil was resorted to with perfect success; the fifth case was successfully treated with the oil from the commencement.

This mode of treating delirium tremens, though it will, doubtless, to most of us appear a strange one, is not uncommon in India, if we may believe Dr. M'Gregor,† who speaks of giving five-drop doses of the medicine with or without opium. The same writer extolls the method of giving opium in delirium tremens in combination with tartar emetic, as recommended by Dr. Graves.

Organic Disease of the Brain.—On the subject of organic disease of the cranial contents we have but little to communicate, there being but two cases which appear worthy of mention, either for their rarity or instructiveness. One of these is a case of colloid cancer of the base of the brain, reported by Dr. Thomas Miller.‡

The patient, a man aged forty, complained of severe pain at the back of the head, with hemiplegia of the right side, and protrusion of the tongue to the *left*. Deglutition was difficult, the patient often coughing up his food. The left side of the

* *Provincial Medical and Surgical Journal*, April 28, 1846.

† See *Medico-Chirurgical Review*, April, 1836.

‡ *Philadelphia Medical Examiner*, April, 1845.

tongue was likewise observed to be paler than the opposite. The patient continued in this condition for some time, but gradually lost flesh and strength. After death the principal lesion was found, as was expected, in the cranium. The brain and cerebellum were substantially healthy, but in the left occipital fossa a gelatinous tumour was discovered, which pressed upon the left lobe of the cerebellum, the junctions of the pons and crura cerebri, and the origins of the sixth, seventh, eighth, and ninth pairs of nerves. The tumour appears to have commenced within the internal ear, making its entrance into the cranium through the internal auditory foramen. Thence it spread over the occipital fossa, and sent prolongations out of the calvarium, through the foramen lacerum and the carotid foramen. These two prolongations coalesced and compressed the ninth nerve as it reached the tongue. The symptoms of this case were thus satisfactorily accounted for. The pressure on the ninth pair was the cause of the paralysis of the œsophagus, and of the protrusion of the tongue to the side opposite to that which was hemiplegic. The interference with the par vagum accounted for the disturbance of the respiration and heart's action. The hemiplegia of the right side was also due to the same compressing agency.

The other case to which we allude is one of cancer of the dura mater, which occurred in the practice of Mr. Herapath,* of Bristol. The patient was a female, aged sixty-six, who was seized with apoplexy, from which she recovered. At the end of a year she complained of severe neuralgic pains in the face, with vertigo, hesitation of speech, and partial hemiplegia of the right side. She eventually became comatose and died. After death a tumour, of a distinctly cancerous nature, was found to spring from the dura mater under the left parietal bone, and had by its pressure caused softening and absorption of the subjacent cerebral substance.

Disease of the Cerebellum.—The uncertainty of the signs by which we endeavour to distinguish disease of one portion of the cranial contents from that of another, is very clearly pointed out by M. Toulmouche,† in an essay entitled "Considerations on the uncertainty of the Functions attributed to the Cerebellum, and

* *Lancet*, March 7, 1846.

† *Gazette Médicale*, No. 29, 1845.

on the absence of symptoms by which we can recognise during Life the different Diseased Conditions of that Organ." The author investigates, in the first place, the physiological doctrines which assign as the office of this portion of the nervous system the presiding over the generative faculty, and of inducing a co-ordinate and harmonious action in the muscular system. Both these doctrines are tested by the result of observations, in which disease was found to exist in this organ after death. With reference to the influence of the cerebellum upon the sexual organs, he clearly shows, that if in some instances disease of that organ has been accompanied by excitation of the generative faculty, in others there was no such manifestation. So also with regard to the regulation of muscular movements.

The truth of the observations of M. Toulmouche is, to a certain extent, countenanced by the reports of two cases of disease of the cerebellum, one by M. Prestel,* of scirrhous tumour, the other an instance of fungoid disease, which was witnessed by Mr. Taylor, of Guildford.† In neither of these cases was the harmonious action of the muscular system at all interfered with, neither was there any peculiarity as regards the generative organs. The symptoms upon which M. Toulmouche relies as indicative of disease of the cerebellum, are pain in the occipital region, continual giddiness, hemiplegia of the opposite side, not implicating the tongue, diminution of the sensibility of the skin, and integrity of the intellectual functions.

Paralysis, Local.—Several cases of local muscular paralysis have lately been put on record,‡ the most interesting of which are two in which the serratus magnus was the muscle affected. The principal sign of this lesion, in both cases, was a tilting upwards of the inferior angle of the scapula, by which it was raised the distance of two or three vertebræ above its fellow. As a natural consequence the superior anterior angle, and with it the shoulder, was depressed. The cause of the paralysis was a strain in one instance, and the effect of cold in the other. M. Rayer supposes that the proximate cause is a paralysis of the external thoracic

* *Gazette Médicale*, Aôut, 1845.

† *Lancet*, August 23, 1845.

‡ *Gazette des Hôpitaux*, Septembre 2, 1845.

nerve, similar to the well-known affections of the seventh pair. Two cases subsequently occurred to M. Nelaton,* in one of which the paralysis was double.

Paralysis of the Seventh Pair, with loss of Taste.—The case recorded under this title is replete with physiological interest. The subject of it was a lad, aged ten years, who was seized with severe pain in the right ear, followed by suppuration and complete paralysis of the right side of the face, without loss of sensation. In addition to these, the ordinary symptoms of paralysis of the portio dura, it was found that the sense of taste was imperfect on the corresponding half of the tongue, quinine producing no disagreeable taste, while on the opposite side its nauseous flavour was perceived as usual. It was clearly ascertained that ordinary sensation was as perfect on one side as the other, *gustation* alone being disordered.

In reference to this and three similar cases, the author calls our attention to the fact that the sense of taste was not entirely abolished, but merely blunted, and that it followed exactly the intensity of the facial paralysis, increasing and improving, *pari passu,* with that symptom. In investigating the physiological explanation of the phenomenon, he disputes the supposition of Longet, that the loss of taste depends, in these cases, upon dryness of the tongue and fauces consequent upon the continual dribbling of the saliva from the paralysed lips,—as well as that of Berard, who attributes it to paralysis of the vidian branch of the chorda tympani. His own mode of accounting for the loss of taste is that it is in no way connected with the fifth pair, but depends essentially upon a motor paralysis of the contractile element of the papillæ, which renders them unable so to apply themselves to sapid substances as that these should produce their ordinary effect upon the true gustatory nerve.†

Two cases of the ordinary form of facial paralysis are mentioned by Mr. Harmer Smith, of Sheffield, which were supposed to originate in the excessive use of tobacco.

Spasmodic Affections.—Under the head of spasmodic affections

* *Gazette Médicale*, No. 79.

† *Archives Générales de Médecine*, 1845.

we have to notice some communications on puerperal convulsions, chorea, and tetanus.

Puerperal Convulsions.—The most interesting communication upon the subject of puerperal convulsion published within the period embraced by the report, is one by Dr. Tyler Smith,* in which the disease is investigated by the aid of the physiology of the excito-motory system, and, as I believe, with the effect of greatly simplifying a subject which has given rise to much contradictory discussion. In accordance with the doctrines of the true spinal system, this author divides the causes of the paroxysms into two classes, those of the *centric* and those of *excentric* origin. The first class includess loss of blood, congestion, asphyxia from closure of the glottis, and emotion. The second, irritation of the incident nerves of the uterus, stomach, intestinal canal, and bladder, as well of those which arise from the general surface of the body.

M. Leva † endeavours to distinguish between true puerperal convulsions and other forms of eclampsia which may be incidental to the puerperal state. The symptoms which he considers to be strictly diagnostic of puerperal convulsion is the persistence of coma between the paroxysms; if the patient recovers her consciousness in the interval, he refuses to acknowledge the presence of the genuine disease.

In the treatment of the paroxysm he is strenuously opposed to artificial delivery, and places but little confidence in blood-letting. His chief reliance is upon mercury, which he exhibits upon the principle that it diminishes the superabundance of fibrine in the blood, upon which he considers the disease to depend.

Chorea.—The intimate connection which subsists between chorea and cardiac disease, though long familiar to the profession, does not seem to attract that general attention which its frequency demands. Impressed with this idea, Dr. Branson,‡ of Sheffield, has made the connection of the two diseases the subject of a communication, with the object not merely of calling attention to the association of the lesions in general terms, but especially to

* *Lancet*, December 7, 1844.

† Memoir presented to the Societé Médicale D'Anvers; *Gazette Médicale*, No. 20, 1845.

‡ *Provincial Medical and Surgical Journal*, November 12, 1845.

demonstrate that an attack of endocarditis, chiefly affecting the mitral valve, is apt to supervene during the existence of chorea. Several cases are related in illustration of this fact, and upon them the following propositions are based :—

1. That a necessity exists for examining the heart constantly in all cases of chorea, since nine out of twenty-one consecutive patients affected with chorea suffered more or less severely from heart-disease.

2. That disease of the heart is frequently the consequence and not the cause of chorea.

3. That the heart-affection which supervenes in chorea, is often extremely insidious, causing little distress at the time, and is only to be detected by a stethoscopic examination, and yet the seeds of future mischief having a direct tendency to shorten life are then and there sown.

4. That the valvular souffle heard in chorea is the result of inflammatory action, and does not depend, as in anæmia, upon an altered condition of the blood—the inorganic murmur in anæmia being heard invariably with the first sound, and loudest over the *aortic valves*, and not at the *apex* of the heart.

5. That the endocardium covering the mitral valve is much more frequently the seat of inflammatory action, in simple chorea unaccompanied by rheumatism, than either the pericardium, or that portion of the endocardium which covers the aortic valves.

6. That unless the heart-affection be attacked in its very earliest stage, little hope remains of restoring the valve to a healthy condition, inasmuch as at the time the bruit is first heard there must exist a deposit of lymph upon or beneath the endocardium covering the valve, sufficiently great in amount to prevent its perfect closure; and unless this deposit of lymph is of very recent formation, even the long-continued use of mercury and counter-irritation, our chief, if not only hope, will be of little avail in promoting its absoption.

7. That mercury is more influential in promoting the absorption of lymph deposited on the pericardium than on the lining membrane of the heart.

8. That when the pericardium is affected in chorea, the rheumatic diathesis is more strongly marked than when the endocardium is the seat of disease.

In the treatment of chorea the Indian hemp is highly spoken of by Dr. Corrigan, and strychnine by Dr. Ross, of Boulogne. The latter medicine had previously been exhibited by Trousseau. (See Dr. Cowan's "Retrospective Address.")

Tetanus.—This disease, like the former, is one which occasionally supervenes upon inflammation of the pericardium, and it is, therefore, highly important, as is remarked by Dr. Burrows, never to consider that we have thoroughly investigated a case of tetanus in its idiopathic form without satisfying ourselves as to the condition of the heart and its investments. Two very instructive cases are given by that author, in which the tetanic symptoms evidently depended upon inflammation of the pericardium, which was not detected during life.

Trismus nascentium, which appears to be a very common cause of infant death among the negro population of America, is considered by Dr. Sims, (*American Journal of Medical Science*, January, 1846,) to be generally produced by the habit which prevails among those people of keeping the child continually laid upon the occiput, by which the occipital bone is tilted forwards and upwards, so as to be overlapped to a considerable extent by the parietal bones. The effect of this displacement, as he shows upon anatomical considerations, is to induce an obstruction to the blood in the spinal veins as they enter the cranium through the occipital foramen, with consequent congestion and extravasation. Cases are given by the author in which rupture of these veins was discovered after death, as well as the displacement in question, and others in which commencing tetanic symptoms were removed by altering the position of the child alone.

The treatment of tetanus, I need scarcely say, remains unsatisfactory, for although several successful cases have been recorded, they recovered under such a variety of treatment that it is difficult to avoid the conclusion that in some of them, at least, the cure took place irrespective of the medicines employed. Those which appear to have been most useful are the various narcotics, and especially the Indian hemp and aconite. In a case related by Mr. Pershaw,* of Jersey, the hydropathic treatment is said to have been effective after all other means had failed; and in

* *Lancet*, February 7, 1846.

another the symptoms yielded to the repeated and prolonged use of the vapour bath.*

SECTION II.—DISEASES OF THE RESPIRATORY SYSTEM.

The great attention which the diseases of the respiratory organs have received since an impetus was given to their study by the discovery of the science of auscultation, has tended to render our notions of their pathology so precise, that there is comparatively little room for improvement or discovery. As might be expected, therefore, we have but few monographs to notice which are specially directed to the elucidation of the diseases of this region; the only two, in fact, which are worthy of notice being that of Hasse on the *Anatomy of the Diseases of the Organs of Respiration and Circulation*, and a small volume by Dr. Marshall Hughes† on the *Elements of Auscultation*.

The work of Hasse offers, perhaps, next to the voluminous writings of Andral, the most complete view of the pathological anatomy of each of the thoracic organs under the various diseases to which they are subject. It is already, I doubt not, in the hands of many here present, as members of the Sydenham Society.

Dr. Hughes has compiled a very useful bed-side manual for the young auscultator; and though it contains nothing which may not be found in the many excellent works of the same character which have recently appeared, it will not fail to accomplish what the author intended, namely to afford the student a concise and easy insight into a most important and, indeed, indispensable science.

General Treatment of Pulmonary Diseases.—Some very important remarks in connection with the treatment of pulmonary diseases in children are to be found in a recently published volume by Mr. Hood. Dr. Golding Bird has called attention to the great benefit to be derived from inhalation of warm moist air, as an

* The subjoined references appertain to recorded cures of tetanus:—*Philadelphia Medical Examiner*, June, 1845; *Medical Times*, July 19, 1845; *Provincial Medical and Surgical Journal*, August 27, 1845; *Gazette des Hôpitaux*, Septembre, 1845; *Dublin Hospital Gazette*, February 6, 1846; *Lancet*, April, 1846; *Edinburgh Monthly Journal*, December, 1845.

† *Clinical Introduction to the Practice of Auscultation*, &c.; London, 1845.

adjunct to other treatment in the diseases of the air-passages. The relief which is thus afforded, especially in the capillary bronchitis of children, is described as most decided; so much so, indeed, that the author affirms that were he compelled to adopt any one system of treatment to the exclusion of others, he would prefer to abide by the one in question. The method of supplying a moist warm atmosphere is sufficiently simple: it consists in allowing the steam of a tea-kettle or other apparatus to diffuse itself in a small room, the crevices of which are carefully pasted up. Dr. Bird has frequently tested the efficacy of the plan in croup, pneumonia, and hooping cough, and suggests it as a valuable precaution where the operation of tracheotomy is to be performed.

Diseases of the Nasal Passages, Larynx, and Trachea—Coryza.—A plan of treatment, by which the author affirms that he is able to cut short an attack of coryza within a few hours, is made known by M. Tessier.* This plan consists in touching as much of the nasal mucous membrane as can be reached with a sponge dipped in a solution of the nitrate of silver, of the strength of ten grains to the ounce. Cases are given in illustration of the success of the method.

Croup.—M. Forget† recommends repeated emetics in the treatment of croup, not as they are generally exhibited at the onset of the disease only, but likewise in the latter stages, in order that the false membranes may be detached by the agitation of the respiratory passages, caused in the act of vomiting.

Dr. Allen,‡ of Middleburgh, United States, speaks favourably of the action of the Sanguinaria Canadensis, or blood-root. It is given early in the disease, and in emetic doses.

Aphonia.—In an interesting paper, published in the first volume of the *Transactions of the London Medical Society,* Mr. Bishop remarks, that many of the cases of loss of voice which commonly present themselves in practice, are due to a relaxation of the vocal chords, produced either by a moist atmosphere, high temperature, or over-exertion of the vocal organs, and are readily amenable to a line of treatment indicated by such a view of their pathology. Mr.

* *Encyclographie des Sciences Médicales*, Juillet, 1845.

† *Bulletin de Therapeutique*, Mars, 1845.

‡ *Boston Medical and Surgical Journal*, January, 1846.

Bishop has derived the best effects from a solution of the nitrate of silver, (ten grains to the ounce,) applied to the fauces with a camel-hair brush.

Diseases of the Lungs.—Obstruction of the Pulmonary Arteries.—The last volume of the *Medico-Chirurgical Transactions* contains additional observations by Mr. Paget in illustration of a remarkable tendency sometimes observed to the formation of coagula in the branches of the pulmonary arteries. These coagula are stated by him to occur both as a primary disease and as a consequence of the other diseases which produce obstruction to the pulmonary circulation, such as œdema of the lungs, pneumonia, cancerous infiltration, &c. The latter class of cases do not offer many points of interest, since there is nothing remarkable in the fact of a coagulation taking place in a vessel whose calibre is diminished by the pressure of extraneous deposit; but it is of importance, not only in a pathological but in a medico-legal point of view, to be aware that in a person in apparent health, coagulation may take place in the pulmonary arteries to such an extent as to cause sudden death, without the co-operation of any other perceptible lesion, and without giving rise to any symptoms which may awaken attention to the fatal process going on. Mr. Paget concludes that the chief cause of the stoppage of the blood, and of its consequent coagulation in these cases, is some morbid state affecting its composition in such a manner as to increase its adhesion to the walls of the blood-vessels. At the time of making the present communication, Mr. Paget does not seem to have been acquainted with the memoir of M. Bouchut above alluded to, otherwise it is probable that he would have traced some analogy between the cases he describes and the general cachectic tendency to coagulation of the blood which the latter author has investigated.

Black Pulmonary Matter.—Miner's Phthisis.—That particular form of pulmonary affection to which the mining population of this and other countries is obnoxious has recently attracted attention from the writings of Drs. M'Kellar* and Brockmann.† The essential character of the miner's asthma, or consumption, is shown

* *London and Edinburgh Monthly Journal*, October and November, 1845, and February, 1846.

† *Allgem. Repert. die gesammte Heilkunde;* translated in *Half-Yearly Abstract*, vol. iii., p. 30.

by the latter author to be a black pitchy appearance of the lung, varying in extent and depth of colour according to the stage to which the disease has advanced; the texture of the lungs is stated to be not otherwise altered, excepting when miliary tubercles or other *accidental* lesions are conjoined. Dr. M'Kellar, however, describes a disease of far more serious import, and one which induces the most marked disorganization of the lungs, consisting in indurations, cysts filled with black secretion, and even cavities of large size. It is probable that the diversity of opinion expressed by these writers regarding the extent of mischief produced, is referrible to a difference in the original constitution of the individuals examined; it is easy to conceive that in a tubercular subject the disintegration of the pulmonary tissue would be more extensive than in one of an originally robust habit, and that from the universal discolouration induced by the carbonaceous matter, it might be difficult to distinguish the destruction produced by the progress of the tubercular affection from that which is solely due to the irritation of the inhaled matter.

In examining the etiology of the disease, Brockmann is disposed to deny the truth of the opinion that it is due exclusively to the inhalation of carbonaceous particles, but thinks that it partly depends upon the deposition of an organic pigment. The reasons assigned by him for this opinion are,—first, that chemical analysis proves the dark matter to contain animal as well as vegetable carbon; secondly, that the specific gravity of the lung does not increase, which would be the case if it were externally invaded by extraneous matter; and thirdly, because some miners, and especially those of the sanguineous temperament, escape it altogether. The theory supported by the author from these considerations is, that the carbon is deposited chiefly from the blood, and is an effort of nature to relieve the circulation of a surcharge of carbon, induced by the circumstances under which the miner is placed; such as the indulgence in a highly carbonized diet, with deficient respiration of oxygen.*

Dr. M'Kellar, on the other hand, maintains that the black matter is not a secretion, but comes from without; but he admits,

* For a comprehensive essay on the black deposit in the lungs of the aged, by M. Guillot, we refer to the *Archives Générales, de Médicine*, Janvier, Fevrier, Mars, 1845.

somewhat contradictorily, that when once located in the lungs, these organs commence the formation of carbon, and so add to the quantity.

In the treatment of the disease we find nothing satisfactory in either of the essays referred to.

Phthisis Pulmonalis.—The past year, I need hardly say, has done little or nothing to negative the surmise of Dr. Cowan, (see "Report of the Reading Dispensary,") "that medicine will never realise greater success than palliative efficacy, or that hygienic precaution will do more than partially control the ravages of a disease, the causes of which are so inseparably intertwined with social existence." But although we are thus obliged to confess the painful imperfections of our art on a subject upon which few of us, perhaps, are allowed to reflect with indifference, it is yet a matter of congratulation to us as a body of honest, as well as scientific men, that this year has not been stigmatized by any new attempt to delude a too credulous public by the announcement of a cure for consumption; that one member of our profession can so far have forgotten his high calling as to lend himself, through two editions, to a statement which is contradicted by the experience of every conscientious observer, is disgrace enough for one generation.

Formation of Pulmonary Tubercle.—In a recent paper upon "The Minute Structure of the Lungs," Mr. Rainey devotes some space to the consideration of the locality and mode of production of pulmonary tubercle. He advises that in order to see the product to the greatest advantage, the lung should be minutely injected, as the contrast of colour renders the tubercular matter very distinct. By this mode of examination, he has confirmed the opinion of Carswell, that the place of election of pulmonary tubercle is the free surface of the vesicular mucous membrane, as well as of that which lines the interlobular spaces. Mr. Rainey, in common with the majority of pathologists, is a disbeliever in the inflammatory origin of tubercle, considering that the natural appearance of the capillary vessels surrounding the product, when compared with the tortuous and unequally dilated vessels going to air-cells filled with fibrine from inflammation, as quite sufficient to decide the question. Hasse, likewise, denies the inflammatory

theory, and proves, microscopically, that the experiments of Cruveilhier, so constantly adduced by the advocates of that theory, are totally fallacious, since the substance which is thrown out around the globules of mercury, which was supposed to be tubercular matter, consists entirely of the composite inflammation globules and pus-cells, and does not exhibit the true tubercle-cell or granule.

These two writers are, however, at variance respecting the softening of the tubercle, Hasse considering the appearance of central softening as illusory, and as depending upon a central enclosure within the tubercular matter, as it is secreted, of the ordinary contents of the air-cells, such as mucus and epithelium scales. Mr. Rainey, on the other hand, thinks this central softening is a necessary consequence of the vascular arrangement of tubercles, for as this matter increases in quantity the central parts will become further and further removed from those vessels by which it was deposited, and consequently will have the greatest tendency to lose their cell-life and undergo disintegration.

Diagnosis of Phthisis.—Some assistance may possibly be afforded in the diagnosis of incipient tuberculization by an auscultatory sign, which was first pointed out by Dr. Latham,* consisting in a soft blowing murmur accompanying the first sound of the heart, and heard over a space bounded by the sternum and cartilages of the second and third ribs. Without expressing any positive opinion as to the rationale of this murmur, Dr. Latham is inclined to believe that it is produced in the pulmonary artery. Since attention has been directed to it, the murmur has been observed by Dr. Winn and Dr. Theophilus Thompson; the latter has noticed it in eight cases, most of which turned out to be manifestly tubercular.

The latter physician, whose opportunities of studying the disease are very extensive, places great faith in the prolonged expiration as diagnostic of incipient phthisis, when the phenomenon is unconnected with bronchitis or emphysema; he also believes the jerking inspiration to be a valuable symptom.

Treatment of Phthisis.—The only observation worthy of notice in reference to the treatment of phthisis is also made by Dr. Thompson, and is to the effect that he has derived more benefit from cod-liver oil than from any other medicine which he has tried.

* *Lectures on Subjects connected with Clinical Medicine*, vol. i.

He has exhibited it in thirty-seven cases, with the following results:—In three cases the oil was discontinued in consequence of the severe nausea which it occasioned; in twelve, the reduction of strength appeared to be slightly retarded; in twelve, there was no perceptible effect; and in ten, the increase of strength, plumpness, and energy, was remarkable. When benefit was derived it was generally to be observed within a fortnight. This testimony, which is confirmed by the experience of several continental writers, certainly warrants us in giving the oil a fair trial in the treatment of consumption.

Pneumonia.—Characters of the Sputa.—The expectoration in pneumonia has been carefully examined by M. Remak,* who has announced a new feature in its composition, which he believes to be strictly characteristic. The appearance referred to consists of fine fibrinous threads, of the form and diameter of the extreme bronchial ramifications, and which, under the microscope, are seen to be composed of very delicate fibrils, laid lengthwise, and enclosing cell-like bodies, similar to those of pus. These fibrilline concretions are noticed in the greatest abundanee in the first stage of the disease, and are, according to the author's observations, (sixty in number,) never seen in the last stage nor that of infiltration; they are, therefore, not looked upon by him as indicative of severity of the attack.

Lobular Pneumonia.—MM. Bailly and Legendre† have contributed a valuable essay upon that condition of the lungs in infants which is usually termed lobular pneumonia. Their object is to deny the inflammatory origin of this condition, and to express their opinion that it is due to deficient expansion of the portion of lung affected, in consequence of which it remains in the condensed state proper to the fœtal period of life. They have adopted this view of the case from the observation that the condensed appearance of the lung in question can be removed by insufflation, which certainly cannot be accomplished in true pneumonic consolidation, although M. Bouchut asserts to the contrary.

Dr. George Augustus Rees‡ vindicates for himself the discovery

* *Archives Générales de Médecine*, Janvier, 1846.

† *Archives Générales*, 1845; Dr. West's "Report on the Diseases of Children," *British and Foreign Review*, October, 1845.

‡ *Lancet*, July 11, 1846.

of the true nature of this state of the lungs, having published upon it as far back as 1839, a date prior to the writings of Barthez and Rilliet, and other French authors, who have given a description of it. This author agrees with Bailly and Legendre as to its non-inflammatory nature, and the injurious effects of lowering treatment. He has noticed a peculiar drawing in of the lower ribs during inspiration as very characteristic of this state of lungs.

Treatment of Pneumonia.—In the treatment of the third stage of pneumonia Dr. Upshur has derived great advantage from the iodide of potassium, in five-grain doses. Dr. Mendini* gives the tincture of cantharidis, in conjunction with blood-letting, and professes to find its action more decidedly contra-stimulant than even that of tartar-emetic.

Gangrene of the Lung.—The Gazette des Hôpitaux, August 30th, 1845, contains a critical inquiry into the pathology of this severe disease, in which the writer maintains the correctness of Laennec's opinion, that it is comparatively seldom the consequence of pneumonia, but is more generally the result of a general debility in broken-down constitutions. That gangrene does, however, occasionally supervene upon circumscribed pneumonic inflammation is not a matter of doubt. I have recently seen a patient, with Mr. Page, of Newmarket, in whom the regular course of the disease, from the first engorgement to the formation of a gangrenous abscess, could be most distinctly traced by auscultation, and Dr. Durrant, of Ipswich,† has recorded a similar instance. In the latter case the fœtor of the breath and nauseous taste of the sputa, which is one of the most distressing symptoms to the patient, was greatly corrected by the inhalation of steam impregnated with creosote. Both the above cases perfectly recovered.

For a very complete description of the pathological changes belonging to gangrene of the lung, I may refer you to Hasse's work already quoted.‡

Pleurisy.—The existence of bronchial respiration, until recently supposed to be diagnostic of consolidation of the lung, in effusion into the pleura, is confirmed by the reports of two cases of disease

* *Annali Universali; Gazette Médicale*, Janvier, 1846.

† *Provincial Medical and Surgical Journal.*

‡ Page 23.

of the heart, with hydrothorax, lately published by Dr. Jackson,* an American physician. The occurrence of bronchial respiration under these circumstances, had been previously noticed by several French writers, more especially by Grisolle, and Barth, and Roger, all of whom had met with it in as many as half the cases examined. That some difference, however, may be detected in the character of the sign as it occurs in hepatization and pleuritic effusion respectively, appears to be generally admitted; in the latter it is decidedly less tubular, and more tremulous than in the former. It is not very clear how far we may be justified in estimating the quantity of the effusion from the fact of the presence or absence of this sign; and in this respect Dr. Jackson is widely at variance with the writers above quoted, who believe that it can only be heard when a thin layer of fluid intervenes between the lung and pleura, whereas in Dr. Jackson's cases it was plainly heard, although the chest was full of fluid.

Empyema.—Paracentesis Thoracis.—Contributions on this subject have recently been furnished by Drs. Faure,† Marshall Hughes,‡ and Olliffe.§ Dr. Faure is of opinion that puncture of the thoracic walls, performed with common prudence, is an operation totally unattended with danger, and regards the fear of the admission of air as without foundation. This opinion is, however, not participated in by Dr. Hughes, who, on the contrary, thinks it of much importance to provide for the exclusion of air. This author also very justly condemns the practice of regarding the operation as a "dernier resort," inasmuch as by delay we allow the lung to be so irretrievably injured by compression, if not bound down by adhesions, that it is altogether unfit for the resumption of its functions, although the concomitant circumstances of the case may be favourable. The author considers that the only means of testing the curative capabilities of the operation is to perform it before the above-mentioned contradictory events have taken place.

The memoir of Dr. Olliffe refers to the performance of paracentesis in acute pleurisy, when the previous treatment has failed in producing absorption. A case is related in which the operation

* *American Journal of the Medical Sciences*, January, 1846.

† *Séance De l'Académie des Sciences Médicales*, September 27, 1845.

‡ *Medical Gazette*, February 13, 1846.

§ Reported in *Medical Times*, December 27, 1846.

was completely successful, the admission of air being prevented by attaching a bladder of gold-beaters skin to the canula.

Hæmoptysis.—A murmur has been described by Dr. White,* of Newcastle-on-Tyne, which he considers to be of importance in connection with the diagnosis of hæmoptysis. It is a crepitating sound, smaller than that of pneumonia, and entirely uninfluenced by respiration.

Several instances of hæmoptysis in young children have occurred during the past year. Dr. Morris,† of Philadelphia, refers to four cases in infants of the age of three months; and Dr. Walker,‡ of Teignmouth, to one in a child of four years. These examples offer no points of interest beyond that of their rarity at the ages specified.

In the treatment of hæmoptysis, M. Schröeder§ has found some benefit from the fumes of belladonna, procured by throwing the dry leaves upon burning coals. This simple expedient is stated to have arrested the bleeding in every case in which it was tried, at the same time producing a feeling of great relief in the chest.

Emphysema.—The anatomical site of this affection is one of the questions which give rise to continual discussions. The latest writer upon the subject is M. Bonino,‖ who endeavours to compromise the question as to the vesicular or interlobular situation of the air, by admitting that there are two or three varieties of the disease existing, and that each is distinct in its causes, progress, and result. The reason that interlobular emphysema does not coexist with the vesicular form, he states to be, that at the same time that the air-cells become gradually distended, the parenchymatous structure of the lungs is condensed under the pressure, so that at length when rupture takes place, the air is prevented from gaining admission into the interlobular spaces. In that form of emphysema which occurs during labour, paroxyms of hooping cough, &c., the air-cells give way with a suddenness which precludes the above-mentioned condensation of the intervesicular tissue.

* *Lancet*, May 25, 1846.

† *American Journal of the Medical Sciences*, July, 1845.

‡ *Provincial Medical and Surgical Journal*, August 13, 1845.

§ *Annali Universali*, Avril, 1845.

‖ *Gazette Médicale*, No. 31.

M. Piedagnel* maintains that death in emphysema of the lungs generally results from the penetration of the extravasated air into the vascular system. In support of this opinion he adduces several cases in which air was found after death in the arterial system of the brain.

Spasmodic Asthma.—Rayer† professes to cure the asthmatic paroxysm by touching the pharynx and velum palati with a sponge dipped in a strong solution of ammonia, applied with a suitable handle. He warns us, however, that in some cases the application is attended with severe suffocative symptoms, so that the remedy must be at best but of questionable utility. As a test of strength, he advises that it should not be stronger than the nostrils will conveniently tolerate.

Pertussis.—A great variety of remedies have, during the year, been recommended in the treatment of hooping cough. Dr. Golding Bird‡ places great faith in alum, especially in the convulsive stage. Dr. Peyroton exhibits liquor ammoniæ, and M. Reichelt§ an infusion of the leaves and flowers of the potato. M. Berndt|| relies upon the endermic use of morphine; Mr. Waddington,¶ upon the vapour of tar; M. Berger** has derived great benefit from one-twelfth of a grain of the nitrate of silver; and M. Aberle, from the ammoniated tincture of cochineal, (cochineal, oz. ij.; liq. ammon., ℥ss.; sp. rect., ℥vii.: dose ♏v.,) and from tannin, which he finds exceedingly efficacious in checking the inordinate bronchial secretion.

Periodic Nocturnal Cough.—Dr. Behrend, of Berlin,†† has noticed a periodic nocturnal cough in children, which he states has not hitherto been described. It is most prevalent in spring and winter, and is rarely met with in summer. It affects children

* *Académie des Sciences, Séance*, September 9, 1845.
† *Annales de Therapeutique*, 1846.
‡ *Guy's Hospital Reports*, April, 1845.
§ *Gazette des Hôpitaux*, Aôut, 1845.
|| *Canstatt. Jahrb.*, 7, Cahier.
¶ *Lancet*, June 21, 1845.
** *Encyclographie des Sciences Médicales*, Juillet, 1845.
†† *Journal für Kinderkrankheiten*, December, 1845.

of all ages, excepting the first few months. The complaint appears in the following manner:—A child who does not exhibit any traces of cough during the day, is awakened during the night by a paroxysm of coughing, which continues for two or three hours, and then subsides. This cough returns at the same hour the succeeding night, persisting for weeks or months, when it disappears spontaneously. The author regards the affection as the result of irritation of the par vagum, and has formed this opinion chiefly from noticing that it is most apt to appear simultaneously with, or towards the termination of, an epidemic of hooping cough. The same kind of cough has also been noticed by Dr. Breniss.*

SECTION III.—DISEASES OF THE CIRCULATORY SYSTEM.

The past year has not been remarkable either for the number or value of communications upon the subject of cardiac pathology. It would seem, indeed, that as far as the general investigation of these diseases is concerned, there is but little space for original observation. In Hasse's work, before referred to, we have a concise and accurate synopsis of the morbid anatomy of this class of diseases; and in Dr. Latham's recent volume† we shall find much that is valuable in reference to their connection with lesions of other organs. The latter part of Dr. Burrows' work is also occupied with the relation between diseases of the heart and the nervous centres. We shall, as we proceed, have occasion to allude to each of these works in a more detailed manner.

Auscultation of the Heart.—The remarks of Dr. Latham upon the stethoscopic study of cardiac diseases possess much practical value at the present time, when there appears to be a tendency to an over-refinement in the science of auscultation. He divides the murmurs occasioned by disease into two great classes,—the *endo-cardial* and the *exo-cardial.* The former are, for the most part, *single,* and soft, and blowing; the latter, almost invariably *double,*

* *Journal für Kinderkrankheiten,* January, 1846.

† *Lectures on Subjects connected with Clinical Medicine,* vol. i.

and of a rougher character. He condemns, as needless and unprofitable, the minute subdivision of endo-cardial murmurs, which many auscultators indulge in, for the sole purpose, it would seem, of rendering their study as uninviting as possible, and suggests that we should be satisfied with the knowledge that a given murmur is endo-cardial, without paying any nice attention to its blowing, sawing, or filing characters. As Dr. Latham justly remarks, the appreciation of heart-diseases, after all, is not to be derived so much from the quality of the sound, as by taking its character in connection with the space in which it occurs, its exact ratio to the movements of the organ, and, above all, in its connections with other information to be derived from the examination of the conditions of those organs, as the liver and lungs, which are known to exercise a powerful influence over the heart's action.

Murmur in the Pulmonary Artery.—The possibility of distinguishing between murmurs originating in disease of the pulmonic and aortic valves, respectively, has generally been considered somewhat problematical; nevertheless, that such possibility does exist has been strongly maintained by Mr. Ormerod,* of Caius College, Cambridge. The cases in which he believes that he has ascertained the existence of a murmur in this artery are of two kinds,—anæmia and acute rheumatism; of these the former preponderate.

Diagnosis of Contracted Mitral Valve.—Some difference of opinion still exists with regard to the production of a bruit by narrowing of the left auriculo-ventricular orifice. M. Fauvel,† after noticing this diversity of opinion, states as the result of his own observations, that the abnormal sound precedes the impulse, and he therefore concludes, from the investigation of a certain number of cases, that a rough sound heard at the apex, and to the left, and immediately preceding the systolic movement, may be the only sign of contracted mitral valve. On the other hand, Dr. Barlow‡ expresses an opinion, which we believe to be the correct one, that the murmur heard in such cases is not in reality due to the mitral lesion, but to some concomitant condition of the

* Read before the Royal Medico-Chirurgical Society.

† *Archives Générales*, and Bennett's Report, *British and Foreign Medical Review*, July, 1845.

‡ *Guy's Hospital Reports*, October, 1845.

heart, generally, according to him, a distended state of the right ventricle, which distention he affirms almost always accompanies disease of the mitral valve.

Connection of Cardiac with other Diseases.—We are indebted to Dr. Burrows and Dr. Latham for some excellent observations upon the mutual dependence of diseases of the heart and other organs. The coexistence of disease of the organ with *acute rheumatism* is too generally known to require lengthened comment. We shall, therefore, only introduce the following short statement of the experience of Dr. Latham,* upon this matter. The total number of cases of acute rheumatism from which he draws his conclusions is 136, of which the heart was affected in ninety, exempt in forty-six. Of the ninety cases, the endocardium alone was the seat of disease in sixty-three; the pericardium alone in seven; the two membranes combined were affected in eleven. Three cases were doubtful. Upon these facts the author comments in terms which cannot be too strongly impressed upon our minds. It is believed, he observes, that among the sufferers from acute rheumatism, one now and then has his heart inflamed; the occurrence is looked upon as an accident, and as not being common. But we see here, that so far from being exceptional, some affection of the heart is the rule in acute rheumatism, occuring in two-thirds at least. Again, the pericardium is generally supposed to bear the brunt of the inflammation under these circumstances; but it appears, in reality, that for one instance of pericarditis, the lining membrane of the heart is inflamed nine times. These are, indeed, as Dr. Latham observes, momentous facts, for when we further consider that out of sixty-three cases the heart is fully restored to a healthy condition in only seventeen, we must no longer consider acute rheumatism as a trivial disease, as we fear is too commonly the case, but one which, for the sake of humanity, the physician should watch from hour to hour.

Affections of the Brain and Spinal Cord in Acute Diseases of the Heart.—The seventh section of Dr. Burrows' interesting work gives us a full insight into this important subject, one which he maintains to have long been, and still to be, a fruitful field of mistakes and misapprehensions.

* *Op. cit.*

It has been incidentally mentioned by many writers on diseases of the heart, that inflammatory affections of its membranes are occasionally accompanied by so much nervous irritation that the attention of the physician is diverted by it from the real seat of disease. Cases of this kind are recorded by Drs. Latham, Bouillaud, Hope, and Bright, and are collected by Dr. Burrows in a condensed form. These cases are of extreme interest, and will well repay perusal. They show distinctly that pericarditis may simulate inflammation of the brain or its membranes, as also mania or dementia, and tetanus, and that it may give rise to symptoms of apoplexy and every variety of aggravated choreal and hysteric movements. Dr. Burrows is assuredly deserving our best thanks for thus distinctly calling the attention of the profession to this point, more especially as it appears that a great difference exists in the mortality of those cases in which the true disease was recognized, and those in which the treatment was directed to the fictitious one, indicated by the nervous symptoms.

Connection of Pneumonia with Diseases of the Heart.—That an intimate connection exists between pneumonia and inflammation of the heart, or its membranes, as it occurs in rheumatism, is shown by statistical information accumulated by Dr. Latham.* It appears that inflammation of the lungs is observed as a complication of acute rheumatism in a certain proportion of cases where the heart is not implicated, but that this proportion is much augmented where the latter organ is attacked; thus in forty-six cases without heart disease, pneumonia occurred five times, or in one in nine, while in eighty-one cases with cardiac complication, it occurred nineteen times, or nearly in one in four. Dr. Latham has further remarked, that pulmonary inflammation is not to be expected in the course of rheumatic fever where the endocardium alone is implicated, the danger appears to consist in the connection between pericarditis and pneumonia. It would appear from this fact that the inflammation originates in the pericardium and subsequently extends, by continuity, to the pleura, and thence to the subjacent pulmonary tissues.

Pericarditis.—Dr. Taylor, of University College, has investigated the causes of pericarditis in an elaborate essay, published in the

* *Op. cit.*

last volume of the *Transactions of the Medico-Chirurgical Society*. The author recognises two principal conditions under which the disease may exhibit itself;—firstly, in persons previously in good health, or during the existence of a disease of sthenic character, such as acute rheumatism; secondly, in persons previously in bad health, or in the progress of some chronic disorder. Of twenty-five cases adduced in illustration, fifteen belonged to the first class and ten to the second.

Of the first class, rheumatism as might be supposed, forms an important item, having been the cause in thirteen cases of the fifteen, and it may, moreover, be concluded that the rheumatic element was in existence in the remaining two, as there was slight swelling of the joints in one and certain objective phenomena in the other, which rendered that supposition feasible.

Of the ten cases in the second category, six had morbus Brightii; in the remaining four the condition of the kidneys was not ascertained. In his analysis of the examples of pericarditis occurring under both the above conditions, Dr. Taylor considers that one and the same state of blood, namely, surcharge with urea, exists, though brought about in a different manner, and to this state of blood the pericardial inflammation is due. The fact of a "blood-disease" being the antecedent not only of pericarditis but other intercurrent inflammations, is strongly insisted upon, and is, indeed, the prominent idea in the essay.

I regret that it is not in my power to give a more complete analysis of this important paper, as it is composed in a style that precludes much condensation; I must, therefore, refer you to the original for the many other points of interest contained in it.

Pericardial Adhesions.—The diagnosis of pericardial adhesions, and their effect upon the economy, form the subject of an essay by M. Aran,* in which he concludes that little disturbance is produced by them when all active inflammation has subsided, and that the disturbance of the cardiac and respiratory functions depends more upon alteration in the nutrition of the heart than upon the adhesions themselves. The pathognomonic sign of this lesion he considers to be a diminution, or extinction, of the second sound. This sound not only loses all clearness, but is shorter and

* *Archives Générales*, 1844; Bennett's Report, *British and Foreign Medical Review*, July, 1845.

more circumscribed, in proportion to the intimacy of the adhesion and the dilatation of the ventricles. He explains this alteration in the second sound upon the supposition that the column of blood cannot impinge with natural force upon the aortic valves, in consequence of the impeded dilatation of the closely invested cavities of the heart.

Abscess of the Heart.—Circumscribed abscess of the heart, unconnected with general purulent diathesis, is a rare occurrence, and the two following cases lately recorded have, therefore, considerable pathological value. The first case, which happened in the practice of Mr. Chance,* is that of a boy, aged thirteen, who was seized with sudden vomiting, followed by collapse and coma, and died the next day. He had previously been in good health, and able to exert himself as much as the general run of boys of his age. On examination, an abscess was found in the parietes of the left ventricle, which had burst into its cavity, as well as into the pericardium, so that the blood must have been contaminated by the admixture of pus. In addition to these appearances the whole track of the intestines was found to be intensely inflamed.

The second case occurred in a child of eight years of age, and is recorded by Mr. Howitt,† of Lancaster. In this case, as in the other, there was no symptom to call attention to the state of the heart, the first complaints being of a pain, apparently neuralgic, in the leg. This boy, as in the other case, also became comatose. After death abscess was found to communicate both with the pericardium, which contained a large quantity of pus as well as flocculent lympth, and with the right auricle.

Tuberculous Disease of the Heart.—Mr. Fenwick‡ narrates the case of a man, who died of phthisis, in whom, in addition to tubercular deposition in the lungs, was found an extensive deposit of the same product beneath the lining membrane of both ventricles, and in the thickened and universally adherent pericardium. The state of the heart was not ascertained during life.

* *Lancet*, May 6, 1846.
† *Lancet*, June 20, 1846.
‡ *Lancet*, February 7, 1846.

Polypiform Concretions.—Some recent observations upon the fibrinous coagula which are met with in the cavities of the heart have been made by M. Parchappe.* This writer discusses the question whether it is possible to distinguish those which originate after death from those formed during life, and whether they are to be attributed to simple coagulation or to an inflammatory process. The former question he decides in the affirmative. He attributes those concretions in which the fibrine is deposited in a thin lamina upon a sanguineous clot, to a *post-mortem* change; those on the contrary, in which the fibrine is deposited, as a nucleus in the interior of the clot, and which are interlaced among the columnæ carneæ, are considered by him to be formed during life. M. Parchappe does not think that there are any certain signs by which concretions produced by endocarditis can be distinguished from the above, but he regards inflammatory polypi as very rare, in comparison with others. In this opinion he is sanctioned by Hasse.†

Rupture of the Heart.—A case of sudden death, from hæmorrhage into the pericardium, is recorded by Dr. Maclagan,‡ which is peculiar, inasmuch as the rent did not extend completely through the muscular substance, so as to communicate with the ventricular cavity; but consisted in a tearing only of the superficial fibres of the left ventricle, by which an opening was made into the coronary vein. The symptoms were those of internal hæmorrhage; but as the bleeding took place more gradually than in ordinary cases of rupture of the heart, the patient did not sink until the expiration of an hour from the time of seizure. Although the case is one of an unusual kind, it is not without parallel. Cruveilhier describes the lesion under the name of apoplexy of the heart; but here, as in a case lately seen by Dr. Andrews,§ the blood does not necessarily make its way into the pericardial sac, but is extravasated among the muscular fibres. Of this an instance occurs quite recently in the *Gazette Médicale*. The proximate cause of the rupture in both cases was supposed to be a fatty degeneration of the

* *Mémoires de l'Académie, Séance*, Mars 2, 1846.

† *Op. cit.*, p. 127.

‡ *London and Edinburgh Monthly Journal*, September, 1845.

§ *London and Edinburgh Monthly Journal*, 1845.

muscular fibre, which renders it less able to withstand the traction of the remaining healthy structure in addition to the distending force of the column of blood. The same change of structure of the ventricular parietes appears also to have been the cause of the laceration in a case reported by Mr. Meade, of Bradford.*

A third case, recently placed on record, is worthy of notice for its extreme rarity, the rupture having occurred in the left auricle. The usual situation, as is well known, is the left ventricle.†

Hypertrophy of the Heart in Early Life.—An excellent article on this subject may be found in the *Half-Yearly Abstract*, vol. iii., from *Roser's Wunderlich Archives.*

The general treatment of Organic Diseases of the Heart is well illustrated in an unpretending, but useful little volume, by Dr. Scott Alison.‡ This author places great reliance upon the preparations of iron, believing, and, as we think, with reason, that in the majority of cases, especially if there be valvular obstruction, it is injudicious to adopt any treatment which has a tendency to lower the muscular power of the organ.

Cyanosis, Statistics of.—One hundred and eighty cases of this condition of the vascular system are analysed by M. Aberle,§ of Vienna, with the following conclusions:—In 100 cases there was deficiency of the septum ventriculorum; in 22 the foramen ovale was open; in 65 it was closed. In four instances the pulmonary artery arose from both ventricles. In 87 cases in which the aorta communicated with both ventricles, the pulmonary artery was much narrowed, or entirely closed, in thirty-seven. Two-thirds of the cases occurred in males The duration of life was as follows:—In 4 cases, twenty-four hours; in 16, fourteen days; one month in 4; from one to two months in 7; two to three months in 6; three to six months in 8; six to twelve months in 11; one to two years in 7; two to three years in 9; three to four years in 11; six to eight years in 11; eight to eleven years in 13; thirteen to sixteen years

* *Medical Times*, June 6, 1846.

† Report of the Liverpool Pathological Society; *Edinburgh Medical and Surgical Journal*, July, 1846.

‡ *Some Observations on Organic Alterations of the Heart;* London, 1845.

§ *Lancet*, August 9, 1845.

in 12; sixteen to twenty years in 8; twenty to twenty-five years in 10; twenty-five to thirty years in 6; thirty to thirty-five in 5; thirty-five to forty-five in 5; forty-five to sixty in 4; seventy years in one case.

Aneurism.—The periodical press of the last year contains the description of three cases of aneurism of the heart and great vessels of more than ordinary interest. The first which we shall mention is one recorded by Dr. Turnbull,* of aneurism of the aorta, bursting into the right ventricle. This termination of the disease is exceedingly rare; a single instance is mentioned by Dr. Hope as the only one he had ever witnessed; another also occurred to Dr. Williams. In all of these cases a continuous rushing bruit was heard over the region of the heart, which Dr. Turnbull considers to be diagnostic of the lesion. The pulse possesses the abrupt jerking character which is observed in aortic regurgitation.

An equally rare case, in which an aneurism of the arch of the aorta burst into the vena cava superior, has been described by M. Cossy.† The author alludes to a similar case mentioned by Mr. Thurnam, and collecting the prominent symptoms of each, determines that the following signs are indicative of communication between the two vessels:—

1. Great œdema, limited exclusively to the upper extremities, neck and face, arising suddenly, and accompanied by violet discoloration and diminished temperature of the integuments.
2. A marked bruit de soufflet, having its greatest intensity at the upper portion of the right border of the sternum.
3. In one case reflux into the jugular vein, with pulsation and blowing murmur, existed.
4. A continual painful whizzing in the ears, vertigo, transient delirium, and eventually coma.
5. Dyspnœa, not urgent; occasional slight hæmorrhages.
6. Sudden appearance and quick attainment of the maximum intensity of the above symptoms.

Dr. Pereira has lately met with an example of supposed aneurismal dilatation of the septum, with bursting into the right ventricle. The patient was a girl, aged fifteen, who died of

* *Lancet*, July 24, 1845.

† *Archives Générales*, Septembre, 1845.

purulent infection. Dr. Pereira acknowledges the possibility that the anormal communication might have been congenital, as it was found at that part of the septum which is sometimes deficient from birth. There is, however one reason not alluded to by Dr. Pereira for thinking that such was not the case in the present instance, namely, that the pulmonary artery was of its usual dimensions. In all the cases on record of deficiency of the septum, and origin of the aorta from both ventricles, the pulmonary artery, as in an instance recently recorded by Dr. Shearman,* was diminished to a third of its natural size.

An additional case of dissecting aneurism of the aorta has been reported by Dr. Thompson.† Death was produced by rupture of the cellular tissue at the base of the heart, and effusion of blood into the pericardium.

Dr. Peacock‡ read the particulars of a case of partial aneurism of the heart to the Medico-Chirurgical Society. The aneurismal pouch was situated at the apex of the organ. The case is remarkable from the fact of the patient living five days after the symptoms of rupture had supervened.

Treatment of Aneurism of the Aorta.—The chief indications to be fulfilled in conducting a rational plan of medical treatment in these severe cases are laid down by Dr. Norman Chevers. The main object is stated to be three-fold:—

"To encourage as much as possible the depositing of thin layers of plastic coagula within the aneurismal sacs.

"To render the circulation through the arteries, capillary system in general, and the principal venous trunks, as free as possible.

"To diminish the volume of the circulating fluids in such a manner as to reduce the proportion of thin watery constituents without diminishing the fibrine, or producing debility in the system; and, lastly, to maintain the muscular powers of the heart."

In speaking of the system of Valsalva, the author is inclined to admit the justice of the principles of that system as carried out by its author. He, however, considers that in the hands of incautious practitioners it has been the cause of a great amount of evil, "becoming in their hands a system of injudicious depletion and

* *Provincial Medical and Surgical Journal*, July 30, 1845.

† *Medical Gazette*, April, 1846.

‡ March 24, 1845.

starvation, instead of being, as it was originally designed to be, a means of tranquillizing the circulation and reducing the fluids, but at the same time of maintaining the power of the vascular organs."

The natural process by which the cure of an aneurism is effected is by procuring obliteration of the sac by layers of firm coagula. In aneurisms of the extremities this alone appears to be sufficient, but in aneurisms of the aorta a far more delicate process requires to be effected, as here the sudden formation of loose coagula will always be liable to occasion rupture of the walls of the sac. "It is necessary in aneurism of this artery," says the author, "to cause the obliteration of the sac by layers of coagulum firm enough to resist infiltration of the blood, and which shall present internally a smooth surface over which the blood may readily glide."

Another object in the treatment much insisted upon by the author, is that of removing visceral congestions, and avoiding all unnecessary irritation and excited action in the organs, at the same time endeavouring to keep up a natural discharge of their functions.

In aneurism, as in every other form of organic disease of the vascular centres, the prolongation of life generally, in a very great measure, depends upon the maintenance of that degree of rest which, while it prevents the capillary obstruction which is attendant upon muscular action, does not deprive the patient of the benefits of air and gentle exercise.

The reduction of the volume of the circulating fluids has always been considered a main point in the treatment of organic diseases of the heart and its appendages, but "unfortunately," observes the author, "depletion has been too often the course adopted to effect this purpose." The desired effect, however, may be far more successfully produced by gradually diminishing the fluid ingesta than by any system of active evacuation; and the fact that the palpitation, lividity of the surface, &c., mainly depend upon the admission of an undue quantity of material into the blood, becomes itself a suggestive that in such cases all unnecessary articles of diet, solid as well as fluid, should be dispensed with.

The author animadverts with severity upon the practice of exhibiting digitalis and other medicines which have a depressing effect upon the power of the heart. The great error, he observes, is in

regarding the palpitation, for which these medicines are generally given, as though it were itself the disease, and not what it really is, the sole means by which an overloaded and obstructed heart is enabled to propel its contents. The rational mode of treatment is clearly, to remove the causes of the obstruction from which the heart suffers, where these are not of a permanent nature; or if this be not possible, to diminish the load of fluid which embarrasses the heart, when the palpitation, being no longer requisite, will cease of itself. It is certainly unwise to administer a medicine which its advocates justly term a "direct sedative of the heart" in a class of diseases where all the worst symptoms arise from the difficulty that organ experiences in propelling its contents.

Whenever, as frequently happens, the patient appears to be gradually sinking from the violence of the paroxysms which attend the failure of the heart's powers, restoratives, or even powerful stimulants, become necessary.

SECTION IV.—DISEASES OF THE DIGESTIVE SYSTEM.

Diseases of the Mouth and its Appendages—Sialorrhœa.—Under this title Dr. Glover,* of Newcastle, describes an instance of profuse salivation, unconnected with the action of mercury or any other medicine. The affection proved remarkably obstinate, and did not appear to be in the smallest degree controlled by the numerous remedies which were employed. M. Moraud has, however, been successful in a similar case with the extract of belladonna.†

Stomatitis.—Aphthæ Infantum.—M. Trousseau and Delpech‡ have devoted a long series of essays to the consideration of aphthous conditions of the mouth in infants, in which they advance the opinion that the spots are not ulcerations, but deposits of a fibrinous pseudo-membrane upon the surface of the digestive mucous membrane, which is in those localities deprived of its epithelium. They regard the affection in the severe form in which it frequently

* *Medical Gazette*, February 27, 1846.

† *Annuaire de Thérapeutique*, 1846.

‡ *Encyclographie des Sciences Médicales*, Mars, 1845.

shows itself in the Parisian hospitals, as one of the manifestations of the poison which gives rise to puerperal fever in the mother.

Gangrenous Stomatitis—Cancrum Oris.—Dr. Duncan* describes an epidemic of gangrenous ulceration of the cheeks and gums, which has lately appeared in the North Dublin Union Workhouse. The patients, who were children of an age varying from a year and a-half to five years, were generally, in the first instance, attacked by diarrhœa, the stools being thin and watery, and deficient in bile, and in all cases eventually charged with blood, either pure or mixed with mucus. When these symptoms had continued for a few days the state of the mouth attracted notice, when the jaws would be found ulcerated, and the fangs of the teeth exposed. If the disease was not arrested in this stage, death was almost inevitably the result.

That this form of disease depended upon a constitutional cause, was made evident by the fact that the gangrene was not universally confined to the mouth, but in some cases attacked other mucous surfaces, and more especially the pudendum. This latter circumstance is of considerable importance, and Dr. Duncan does not fail to attach to it full weight in drawing a distinction between the present form of ulceration of the gums and that which arises from mercurial action.

The treatment relied upon by Dr. Duncan consisted, in the first place, in attention to the diarrhœa which preceded the ulceration, and this he found to be most readily checked by an acidulated decoction of bark, combined with speedy and decided counter-irritation of the abdominal parietes. Local applications to the gangrenous parts were not observed to be in the least degree beneficial.

Hypertrophy of the Tonsils.—Professor Huss,† of Stockholm, has advised compression as a means of reducing chronic enlargement of the tonsil glands. His custom is to introduce the index finger into the mouth, and to press the indurated gland for several minutes three or four times a day. He states that after a few days perseverance in this plan absorption commences, and is

* *Dublin Journal of the Medical Sciences*, September, 1845.

† *Gazette des Hôpitaux*, No. 94.

manifested plainly in the shrivelled and relaxed aspect which the gland assumes. When this condition has been attained, he completes the cure by the use of stimulating gargles.

Diseases of the Alimentary Canal.—Perforation of the Stomach.—In a late number of the *Dublin Journal*, Dr. Osborne has published a paper, in which he has endeavoured to ascertain if there be any signs by which the insidious ulceration of the stomach, which leads to perforation, can be determined during life. The interior of the stomach, he observes, in a healthy state is insensible to touch; but if any portion of its coats be denuded or eroded, it then assumes a sensibility similar to that of ulcers on other parts of the body. Upon this assumption he founds his views upon the diagnosis. He has found, in certain cases which proved fatal by perforation, that the patient was comparatively free from pain in certain positions, but especially in the semi-erect posture. This fact, taken in connection with the ascertained frequency of this form of ulceration in the lesser curvature, may, he thinks, be fairly considered to demonstrate that the pain is caused by the contact of the acid fluids of the stomach with the denuded surface; as would naturally occur when in the supine position, these fluids rise upon a level with the lesser curvature. He, therefore, proposes this aggravation or subsidence of pain, by variation of posture, as a means of diagnosis of the existence of ulceration.

Several additional cases of perforation of the stomach have been recorded, but, with the exception of two or three which we shall mention, they are without interest. Of these, two were remarkable in being followed by general emphysema, an occurrence which could not in any way be explained by the *post-mortem* appearances.

The first* was the case of a surgeon, in Belgium, who was seized with symptoms of rupture of the stomach, after a full meal; the second, that of a sailor, who was seized in a similar manner, and under similar circumstances. The remarkable feature in both cases was a general emphysematous distension of the cellular tissue of the integuments, in the first case extending throughout the entire surface; in the second, limited to the upper half of the body; in both, the greater curvature was found to be lacerated. No mention is made of any pulmonary lesion by which the appearances of the emphysema could be accounted for. In the latter

* *Half-Yearly Abstract*, vol. iii., p. 186.

case, the narrator, Dr. Carson, of Liverpool, attributes the rupture to extreme distention of the stomach, caused by gas evolved from acetous fermentation of its contents.*

Dr. Davies† has called attention to the great importance of being able to distinguish the peritonitis caused by perforation of the digestive tube, from that depending upon other causes, as the treatment in the two forms ought to be widely different, more especially as regards the exhibition of medicines by the mouth. The diagnosis is to be founded upon the suddenness of the access of pain in peritonitis from perforation, the universal diffusion of the tympanites, which shows that the air is contained in the peritoneal sac and not in the intestines, and the existence of strangury and other symptoms of vesical disturbance, which appear to depend upon the descent of the contents of the ruptured viscus upon the fundus of the bladder.

Obstruction of the Bowels.—Four cases of intestinal obstruction have been placed on record during the past year, which possess features of some interest. In one which was witnessed by the late Dr. Hocken,‡ constipation had resisted treatment for a period of three months, and entire obstruction had existed for one month. Relief was eventually obtained by the mechanical removal of a large mass of indurated fæces from the rectum.

In a second case, related by Dr. Campbell,§ ileus, in its most violent degree, was occasioned by the impaction in the rectum of a large concretion, which proved to be composed of hardened biliary matter. On its expulsion the patient speedily recovered.

Dr. Todd|| relates a case of obstruction, which, after the unsuccessful application of the usual remedies for twenty days, yielded at length to the inflation of the bowels with air.

In Dr. Henderson's case of obstruction depending upon intussusceptio, relief was obtained by the pressure of a column of water of thirty inches, applied by means of a tube of that length, one end of which was inserted into the rectum.¶

* *Edinburgh Medical and Surgical Journal*, July, 1846.

† *Medical Gazette*, September 12, 1845.

‡ *Edinburgh Medical and Surgical Journal*, January, 1846.

§ *Medical Gazette*, February 21, 1846.

|| *Lancet*, September 12, 1845.

¶ *Encyclographie des Sciences Médicales*, Decembre, 1845.

Constipation.—In the treatment of habitual constipation arising from atony of the muscular coat of the bowels, M. Tessier* recommends enemata of cold water, and the internal exhibition of the nux vomica. Dr. Aldridge† speaks highly of alum in similar cases; and Dr. Norman Chevers,‡ of large doses of the sulphate of zinc.

Diarrhœa.—The green evacuations of children, which have hitherto been looked upon as the result of the irritating effects of mercury upon the liver and intestinal canal, have recently been carefully examined by Dr. Golding Bird, who has asserted that the green colour does not depend upon the presence of bile, as has commonly been supposed, but upon the presence of modified blood. He regards, in fact, these green stools as an evidence of a congested state of the portal system, in which the blood is exuded slowly and in minute quantities, so that its colour is readily affected by the gaseous and fluid secretions of the bowels. The practical deductions from these observations, if correct, are obvious.§

Diseases of the Liver.—The diseases of the liver have been illustrated in two separate monographs during the past year, one by Dr. George Budd,‖ the other, more recently published, by Mr. Parkes,¶ late Assistant-Surgeon to her Majesty's 84th Regiment. The latter of these works we have not had the good fortune to see, but Dr. Budd's volume may be safely recommended as offering a very complete insight into a class of diseases more than any other, with the exception of those of the nervous system, involved in obscurity.

Hepatitis.—A communication upon hepatitis, as it appears in Algiers, has been furnished by M. Casimir Broussais.** The disease is similar in its symptoms and progress to that observed in India, but the practice of the French writer differs considerably from that

* *Encyclographie des Sciences Médicales*, Decembre, 1845.
† *Dublin Hospital Gazette*, July 15, 1845.
‡ *Medical Gazette*, February 27, 1846.
§ *Lancet, and Half-Yearly Abstract*, vol. ii., p. 46.
‖ *On Diseases of the Liver*, 8vo., London, 1845.
¶ *Remarks on the Dysentery and Hepatitis of India*, 1845.
** *Half-Yearly Abstract*, vol. ii., p. 223.

of the Indian practitioners, as he appears to place more confidence in general and topical blood-letting, and relies less upon the heroic exhibition of mercurials.

Suppurative inflammation of the liver forms the subject of some instructive remarks by Dr. Budd, which are particularly worthy of perusal. From a table of sixty cases in which abscess of the liver was found after death, he finds that the causes of the affection are chiefly three—first, but most rarely, mechanical injury; second, and more frequently, suppurative inflammation of some vein; third, and most frequently, ulceration of the lower bowel, as it occurs in dysentery. The great influence of the latter disease as a cause of hepatic abscess, is also acknowledged by M. Broussais.

A rare instance in which abscess of the liver burst into the pericardium is reported by Mr. Allan,* of the Mauritius.

Jaundice.—A fatal form of jaundice is described by Dr. Budd, which does not appear to be of very general occurrence. It is produced by a serious disorganization of the hepatic cells, independent of inflammation, and giving rise to a softened condition of the organ. Several cases are recorded by the author, the course of which was as follows. The jaundice supervenes somewhat suddenly, the colour of the skin being intensely yellow. There is little or no fever, nor tenderness of the abdomen, and the pulse is not usually above 70 or 80. Soon, however, symptoms of poisoned blood begin to show themselves, the stomach becomes excessively irritable, delirium sets in, and the patient eventually dies comatose, with or without convulsion. A remarkable peculiarity in this form of jaundice, mentioned by Dr. Budd, and which we have ourselves witnessed, is its tendency to attack several members of the same family. Medical treatment has but little influence over this fatal disease; the cases which recover appear to do so from a spontaneous subsidence of the destructive cellular action, whatever it may be, rather than from any tangible advantage derived from medicinal means.

M. Decaisne† seeks to demonstrate that icterus does not always depend upon biliary derangement; but that there is one form of the disease in which the discoloration of the skin is produced by

* *Lancet*, June 7, 1845.

† *Gazette Médicale*, Mars 17, 1845.

some change in the constitution of the blood, and is altogether unconnected with a redundancy of bile. It is obvious, however, that the latter affection, which he calls idiopathic icterus, and which consists in a *sallow* alteration in the colour of the integument, has no title to be included in the same class with jaundice properly so called, but is merely the result of a cachectic condition of the body in general, in which less blood, or blood of an altered character, circulates in the cutaneous vessels.

It is asserted by M. Lonjon,* that a yellow discoloration of the palate invariably precedes the icteric tinge of the rest of the body. He maintains that by this appearance an attack of general jaundice may be predicted with certainty.

Fatty Liver.—The frequent association of fatty liver, in all its gradations, with tubercular diseases of the lungs, has led many writers to insist upon an antagonism of the two organs as the cause of the fatty infiltration. M. Schlossberger† and Dr. Budd‡ both consider such an explanation to be untenable, instancing, as corroborative of their opinion, the facts ascertained by M. Rokitansky, that fatty liver not only occurs in tuberculous disease of the lungs, but in tubercular disease in general, in whatever organ the deposit takes place. Dr. Budd is inclined to the belief that the fatty liver of phthisis pulmonalis is in some manner connected with the hectic and wasting of the latter disease, in which the fatty matters distributed throughout the system being reabsorbed into the blood, become entangled in the hepatic cells in consequence of the large size of the oil-globules. M. Schlossberger attributes the disease to an alteration of the blood consequent upon the tubercular dyscrasia, which, by using up the albuminous ingredients of that fluid in the deposit of tubercular matter, causes the oleaginous principles to preponderate.

Further observations on fatty degeneration of the liver may be found in a paper by Dr. Horaczek,§ (*Schmidt's Jahrbücher,* 46 Band, 1845,) and in another by Dr. Franz Schuh.‖ We may also refer

* *Gazette Médicale*, No. 17.

† *Archives für Physiologie; Medical Times*, October, 1845.

‡ *Op. cit.*

§ *Half-Yearly Abstract*, vol. iii., p. 53.

‖ *Schmidt's Jahrbücher*, No. 3, 1846.

to a paper by Dr. Black, in the *Provincial Medical and Surgical Journal*, of May 6th of the present year.

Hydatids.—An interesting case of hydatid abscess of the liver is detailed by Mr. Alexander,* of Halifax, Nova Scotia, in which a cure was effected after evacuation by the trocar. A young lady, aged twenty, after having suffered from the endemic fever of the West Indies, became the subject of hectic fever, with great debility, with a prominent, smooth, and indistinctly fluctuating tumour in the epigastrium. As the latter symptom became more decided, a trocar was introduced, under the impresssion that it was a case of ordinary hepatic abscess. The contents proved to be those of a suppurating hydatid cyst, consisting of offensive pus, with perfect, as well as the debris of, dead hydatids. After a course of tonic treatment, and the profuse evacuation of similar matter for a considerable time, the cavity diminished, and the patient eventually made a complete recovery.

Diseases of the Pancreas.—Dr. Melion,† of Freudensthal, has published an essay, with the object of giving more precision to the diagnosis of pancreatic diseases. Four cases are recorded, in two of which he was able to verify his observations by *post-mortem* examinations. The symptoms were pain in the epigastric region, vomiting of albuminous fluids, constipation alternately with diarrhœa, fixed pains in the loins and shoulders, rapid emaciation, and great mental depression. In the first fatal case the pancreas was found adherent both to the liver and stomach, and was of a cartilaginous hardness; in the second, the organ contained a cavity in its centre, filled with an ichorous fluid. It is to be feared that in the catalogue of symptoms above mentioned, there is none which can be considered as in the slightest degree aiding the author's object; Dr. Dick‡ is, beyond doubt, correct in the statement that there is no single symptom strictly indicative of pancreatic disease, and that no system of treatment, therefore, can be laid down. M. Cenric§ has noticed the connection between pancreatic disease and spermatorrhœa.

* *Medical Gazette*, December 19, 1845.

† *Casper's Wochenschrift.*

‡ *Medical Gazette*, October, 1845.

§ *Gazette Médicale*, Septembre 28, 1845.

Extra-Peritoneal Dropsy.—Dr. Scott,* of Harrisonville, United States, met with a case which may be thus briefly narrated:—In a female, aged twenty, the abdomen began gradually to enlarge from the age of fifteen to the period of her marriage. Soon after this time the distention became so great that paracentesis was performed, and seventeen gallons of fluid, supposed to be ascitic, were drawn off. The operation was subsequently repeated several times, and each time as large a quantity was evacuated. The patient eventually sank from exhaustion, and was examined after death, when it was discovered that these immense collections of fluid were not contained in the peritoneal cavity, as had been supposed, but in an immense cyst, situated in the cellular tissue of the abdominal parietes.

SECTION V.—DISEASES OF THE URINARY SYSTEM.

Morbus Brightii.—This important affection of the kidneys, known under the name of morbus Brightii, has at no time since its investigation by the talented physician whose name it bears, excited more attention than it has recently done upon the occasion of the announcement of the veiws of Dr. Johnson, of King's College,† respecting its pathology. The true nature of the disease is believed by this writer to consist in a peculiar morbid condition of the epithelium cells lining the uriniferous tubes, which leads to their abnormal engorgement with fat or oil-globules. This view he regards in the light of a discovery, but, as we shall presently show, although he is indubitably entitled to the credit of bringing the subject prominently before the profession in this country, he has been anticipated in the mere anatomical fact of the presence of fatty globules in albuminuria by several writers, among whom we may mention Eichholtz, Lebert, Gluge, and Canstatt, &c., &c.

Dr. Johnson believes that the accumulation of fat in the secretory cells of the kidneys leads to the dilatation of the tubules, and that it is the transverse section of these which constitutes the appearance known as "granulations." The atrophy of the kidney and the

* *American Journal of the Medical Sciences*, October, 1845.

† *Medical Gazette*, November, 1845.

presence of albumen in the urine, are both attributed to the mechanical effects of this accumulation. The author does not admit any congestive stage prior to that of deposition, and believes that the varieties of the disease depend essentially upon the greater or less rapidity of the deposition of fat.

This fatty degeneracy of the kidney is considered to be of constitutional origin, and like the same condition of the liver, to require a constitutional rather than local treatment. The author repudiates the idea that there is any connection between this disease and scarlatina. The treatment laid down by Dr. Johnson consists in a tonic regimen in respect to diet, atmosphere, exercise, and medicine; in the avoidance of all exhausting remedies, and abstinence from fat and other carbonized matters as articles of food.

The announcement of these views produced a discussion at a meeting of the Medico-Chirurgical Society, in which a variety of opinions have been elicited. To the opinion that the albumen in the urine is due to the mechanical effect of the fatty accumulation Dr. Snow objected that, in the latter stages of the disease, in which, if Dr. Johnson's theory be exclusively adopted, the albuminous excretion should be most copious, it is no uncommon thing for the albumen to be greatly diminished in abundance, or even to disappear altogether. He also observed, in reference to the diet, that it is questionable whether, in strictly confining the patient to nitrogenized food, we are not incurring the risk of coma and other cerebral symptoms, by loading the blood with urea, which the damaged secretory apparatus of the kidney would fail to eliminate.

In respect to the propriety of bloodletting in the early stage of the disease, which is disapproved of by Dr. Johnson, Dr. Copland and Dr. C. J. B. Williams offered a contrary opinion. The latter, in particular, observed that he knew of no other treatment so beneficial in the early stage, especially of the acute form. Dr. Budd considers the hypothesis of Dr. Johnson as inadequate to explain the phenomena of the disease. He alluded to the parallelism of fatty liver, to show that there was this difference between fatty liver and its affirmed congener, Bright's kidney, that in the former, secretion is not materially interfered with, while it is greatly interrupted in Bright's disease.

The above pathological deductions of Dr. Johnson are also criticised by Mr. Robinson,* who is well known for the attention which he has bestowed upon the investigation of this disease. Mr. Robinson does not, however, question the microscopical observations of Dr. Johnson, but solely the reasoning which he has based upon them. He proceeds to show, that even granting the presence of fatty cells, as asserted by Dr. Johnson, there is nothing in their presence to militate against the opinion advanced by himself, (*Inquiry into the Pathology of Granular Kidney*, 1842,) that the existence of albumen in the urine is due to a disturbance in the circulation. He observes that he has proved by actual experiment (tying the renal vein,) that the only condition absolutely necessary for the production of albuminous urine is undue compression of the smaller vessels of the kidney. It follows, therefore, if the fidelity of these experiments be granted, that there is no constant connection between the above condition of the urine and the presence of fat in the epithelium cells. And since the exciting and predisposing causes of the disease are those which have a known tendency to induce renal congestion, and since that congestion has been found to be capable of producing albuminous urine, the writer concludes that the pathological appearance discovered by Dr. Johnson is not a necessary element in the disease, although it may be an occasional one.

On the other hand it may be observed that Dr. Johnson's views have met with the strenuous support of Dr. Todd,† and, still more recently, as far as we can understand from an imperfect abstract of his Essay in a weekly journal, have been also countenanced by Mr. Toynbee. The concurrence of opinion is, however, confined to the fact of the fatty degeneration, as Mr. Toynbee avows his opinion that a stage of congestion, as is maintained by Mr. Robinson, precedes the other changes in the kidneys.

The essential pathological element of Bright's disease (according to Eichholtz,‡) consists in the generation of an abnormal fibrous tissue in the kidney, analogous to that which is found in cirrhosis of the liver, which tissue operates in producing compression of the renal capillaries. The generation of this tissue is not, according

* *Medical Gazette*, December 19, 1845.

† *Medical Gazette*, December 10, 1845.

‡ *Müller's Archiv für Anatomie, &c.*, 1845.

to this author, a local affection, but is part of a general diathesis, and may occur not only in the kidney and liver, but also in the lungs and spleen. The development of this tissue in the lungs is said, in cases of phthisis, to be capable of exercising a salutary effect upon the progress of the disease, by leading to the cicatrization of tuberculous cavities. The essay in which these doctrines are enunciated is too long for entire analysis in the present report; we therefore refer our readers, for further details, to the pages of the *Medical Gazette*, (November 21 and December 5, 1845,) where the essay will be found faithfully translated. We have space only for the following conclusions:—

1. That there is a disease which commonly attacks the liver, spleen, and kidneys, which depends upon an abnormal condition of the blood, and is manifested in the development of an accidental tissue of fibro-cellular formation, which compresses the glandular structure of the affected organ, and interferes with its functions.

2. This peculiar formation, when it occurs in the kidneys, is known under the designation of "granular degeneration." In this organ the formation goes through two stages, the one characterized by the deposition of fat, the other by the development of fibrous tissue.

3. A similar fatty and fibrous degeneration occurs in the liver, having the same mutual relations.

4. In the lungs we have an example of one diathesis extinguished by another, viz., the tuberculous by one which has no name, but the symptoms of which are granular degeneration of the liver and kidneys.

M. Lebert,* in speaking of the microscopic granulations in "Bright's disease," remarks that "the granulations of Bright exhibit, as their microscopic elements, molecular granules and aggregated globules; sometimes we find also fat-globules." They are situated sometimes in the Malpighian corpuscles; sometimes in the uriniferous canals; sometimes in the interstitial substance, between the vessels and secretory apparatus.

That the presence of fat-globules in the kidneys in "Bright's disease" was known to Canstatt, as well as to Lebert and Eichholtz, appears certain, from the following extract from his work, *De Morbo Brightii*, published in 1844, made by Dr. Willshire:†—

* *Physiologie Pathologique*, tome i., p, 515.

† *Medical Times*, December 13, 1845.

"The author found in the liquid obtained by expression of the cortical substance, a large quantity of fatty globules, soluble in sulphuric ether, and irregular oval cellules, soluble in acetic acid. The medullary substance contained a like abundance of fat.

"These two varieties have this in common—the volume of the cortical substance is augmented by a matter of new formation, deposited either in the uriniferous tubes, or in the intermediate tissue between the tubes and the vessels, from which results compression of the latter, and decoloration of the cortical substance. Microscopic observation teaches us that this new formation is composed sometimes of simple and conglomerated granules, transformable into fibres, at other times of fatty globules and vesicles."

An anonymous writer (*Lancet*, February 21, 1846,) likewise proves that the existence of the fat-globules in "Bright's disease" was known to Gluge.

Dr. Quain has paid considerable attention to the microscopic changes manifested by the kidneys in "Bright's disease;" but his observations do not afford countenance to the idea that fatty degeneration is an essential pathological change. It is true that he has occasionally met with fat-globules as an ingredient in the composition of the granulations; but the great bulk of this alteration he has invariably found to consist of that inorganizable material to which Dr. Williams has applied the appropriate term of *caco-plastic*. This material is found by Dr. Quain to occupy the interstitial structure as well as the tubules themselves, and is believed by him to be a secondary change, depending upon what the Germans would call an "albuminous dyscrasy," induced by intemperance and other anti-hygienic agents.

The last contribution which we have occasion to mention in connection with albuminuria is a series of papers by Dr. Alexander Wood, published in the *Northern Journal of Medicine*.* We can recommend these as containing an excellent summary of our acquaintance with the disease, brought nearly up to the present time.

Eneuresis.—Incontinence of urine in children has been observed by Dr. Berenguier† to have some connection with intermittent

* December, 1845.

† *Journal für Kinderkrankheiten* and *Dublin Journal*, May, 1846, p. 555.

fever, being apparently a symptom of the debility which accompanies the characteristic anæmia of malarious districts. The most appropriate treatment was found to be a combination of copaiba, laudanum, and the protoxide of iron made into pills.

In the same disease belladonna has been used successfully by Dr. Morand,* in the dose of one-fifth of a grain of the extract taken twice a day, and increased at the end of a week, if no effect be produced.

Chylous Urine.—An instance of this remarkable condition of the renal secretion, in which coagulation of a substance resembling curds and whey, or blancmange, takes place spontaneously, is recorded by Dr. Bunyon,† of British Guiana. After being unsuccessfully treated by other means, the patient eventually recovered under the use of the Rhizophora racemosa, a species of mangrove.

Alkaline Urine.—Dr. Krukenberg‡ has called attention to the fact that the urine is often rendered alkaline by eating fruit, and inculcates the necessity of being acquainted with this circumstance in forming a diagnosis of diseases in which alkaline urine is liable to occur.

Dr. Aldridge§ has published, in a separate form, his useful lectures on the urine, which originally appeared in the *Dublin Hospital Gazette.* We can recommend them as offering a plain, and at the same time a faithful, survey of the most interesting points connected with urinary pathology.

SECTION VI.—DISEASES OF THE REPRODUCTIVE SYSTEM.

The diseases of the genital organs, the consideration of which can, with propriety, be introduced into the present Address, are comparatively few in number, and these confined to the female sex.

Diseases of the Ovaria.—Diseases of the ovaries have recently

* *Annuaire de Thérapeutique*, 1846, p. 18.

† *Lancet*, January 24, 1846.

‡ *Henle's Zeitschrift; Half-Yearly Abstract*, vol. p. 226.

§ *Lectures on the Urine*, &c., Dublin, 1846.

assumed a very prominent position in the attention of the profession, in consequence of the attempts which have been made to establish the ablation of the diseased organs as one of the recognized operations of surgery. It is not my intention to enter at all into this part of the subject, as it does not come strictly under the department of practical medicine, and an ample statement of the question as it at present stands, with an account of the most recent cases, is elsewhere to be found.* My object on this occasion is to mention what has been done with reference to the removal of the disease, without having recourse to a method so severe and dangerous.

In this point of view we have communications before us of great interest, some of which relate to the diagnosis and cure of diseased ovarian tumours, others to their spontaneous recovery, by rupture or otherwise.

In the diagnosis of ovarian tumours the microscope has been turned to considerable account by an indefatigable pathologist, Dr. Hughes Bennett,† of Edinburgh, who has thereby ascertained that the fluid contained within ovarian cysts may at once be recognized, and with certainty distinguished from that of ascites.

The plan of Mr. Brown, of treating ovarian dropsy by pressure and mercurials, has been successfully pursued by Mr. Eccles;‡ but it must be remarked that in this and in Mr. Brown's cases, tapping was likewise had recourse to, although the sole credit of the cure is given to the internal treatment.

Cases in which the spontaneous cure of ovarian dropsy has occurred by rupture and effusion of the fluid into the peritoneal sac and subsequent absorption, are recorded by M. Camus, and more recently still by Mr. Eager,§ of Guildford; other instances are also related by Lebert, and in the *Annales de Thérapeutique* of last year.

Diseases of the Uterus.—Inflammation of the Os and Cervix.—The profession is much indebted to Dr. James Henry Bennet,‖ for the impulse which he has given to a more correct appreciation

* *Half-Yearly Abstract*, vols. i., ii., and iii., *Reports on Midwifery.*

† *Edinburgh Medical and Surgical Journal*, April 1, 1846.

‡ *Lancet*, March 7, 1846.

§ *Provincial Medical and Surgical Journal*, February 11, 1846.

‖ *Practical Treatise on Inflammation, &c., of the Os and Cervix Uteri*, London, 1845.

of the various changes which the os and cervix uteri are liable to undergo as the result of inflammation, and for the clearness with which he has pointed out a simple and efficacious mode of treatment. Although it is little to be wished that occular examinations of the female genital organs should be conducted with the same *sang froid,* both on the part of the patient and the medical man, as in France it is, nevertheless, to be lamented that the opposite extreme of delicacy should, in this country, so frequently stand in the way of accurate diagnosis in a class of diseases of more social importance than those of any part of the body. The importance, or rather the absolute necessity, of the employment of the speculum, is much insisted upon by Dr. Bennett, and, of course, forms a prominent feature both in his means of diagnosis and treatment.

It appears from his researches that a wide distinction in degree exists between the pathological conditions of the uterine neck in females who have, and those who have not, conceived. In the latter, inflammation is usually limited to the more superficial structures of the organ, and rarely proceeds to the extent of inducing ulceration; in the former, on the contrary, especially in those women who have suffered abortions or tedious labours, the deeper tissues become involved with great readiness, and a series of changes ensue which gives rise to symptoms of great variety as well as severity, and offers much embarrassment to the medical practitioner. These changes consist in a greater or less amount of engorgement and induration, with or without ulceration. The treatment recommended by Dr. Bennet varies according to the severity of the cases. In the first class of cases, emollient or slightly astringent injections, with perfect rest of the parts, will generally be sufficient to effect a cure. For the more severe cases, leeches to the cervix will be necessary, together with repeated cauterization with the nitrate of silver, or with other caustics of greater power, as the acid nitrate of mercury, or the Vienna paste. The method of using these, with a description of the cases in which they are required, will be found very distinctly laid down in the original.

The same subject has also been treated of in a comprehensive series of papers by M. Boys De Loury,* by MM. Peraire† and

* *Gazette Médicale*, Juin, 1845; *Half-Yearly Abstract*, vol. ii., p. 168.

† *Ibid*, No. 7, 1845.

Devay,* and by Dr. Roberts.† The latter writer agrees entirely with Dr. Bennet, as to the diagnostic value of leucorrhœa in women who have been exposed to sexual intercourse.

Rheumatism of the Gravid Uterus.—That the womb, like other muscular organs, may occasionally be attacked with rheumatism, has been known for a period of nearly two centuries; but whether from its rarity, or its having frequently been confounded with other states of the organ, it seems of late years to have attracted but little attention.

The best, as well as the most minute account of the affection with which we are acquainted, is to be found in a book published during the past year in America, the translation of *Colombat d'Isere on the Diseases of Females,* by Dr. Meigs, in which it appears in a note by the editor, extracted from *M. Cazeaux' Treatise on Obstetrical Medicine.*‡ It likewise forms the subject of an essay by Dr. Isaac Taylor, of New York.§

Rheumatism of the womb is stated to occur most frequently in persons in whom the lithic acid diathesis predominates, and often to depend apparently upon metastasis of rheumatic action from another part, as a joint or muscle. It is indicated by severe pain, with intolerance of pressure, and many other symptoms so closely resembling inflammation of the organ that the diagnosis is of great difficulty. M. Cazeaux gives us no rules by which this diagnosis can be made. Dr. Meigs, however, considers that rheumatism of the womb may be satisfactorily ascertained by the "toucher." He observes that both in metritis and in rheumatism the touch is at first painful, but that there is this difference, that in the latter the pain entirely ceases, or is greatly mitigated if the organ be gently raised upwards by the two fingers; not so, however, in inflammation, in which the pain is proportioned to the prolongation of contact. The influence of uterine rheumatism upon the process of parturition, and its consequent effects, is minutely considered by M. Cazeaux, and would appear to consist chiefly in the production of abortion, irregular and painful contractions of the organ before

* *Ibid*, No. 27.

† *New York Journal of Medicine;* in *Lancet*, October 22,1845.

‡ *Traité Thèorique et Pratique de l'Art des Accouchemens*, Paris, 1845.

§ *American Journal of the Medical Sciences*, July, 1845; *Half-Yearly Abstract*, vol. ii., p. 154.

the expulsion of the child, and retention of the placenta after that event. The treatment, as stated by both writers, is confined to the exhibition of sedative sudorifics, with local fomentations.

SECTION VII.—DISEASES OF UNCERTAIN OR VARIABLE SEAT.

Scrofula.—In a recent publication by Mr. Phillips the pathology of scrofula has undergone a thorough and careful revision, with the result of the promulgation of several opinions much at variance with preceding writers, and, I may add, with general experience also.

Scrofula is defined by Mr. Phillips to be a constitutional affection, the chief expression of which is to be found in engorgement of the subcutaneous lymphatic ganglia, with deposition of *scrofulous* matter. When the latter is wanting he regards the proof of a scrofulous constitution as imperfect. With respect to the external characteristics of the diathesis, the author accords with Lugol in many particulars. He believes, for instance, that it may exist under every variety of appearance, and denies its greater prevalence in persons of light hair and eyes. In proof of this he adduces the fact, that out of 9,000 scrofulous children examined by him, only thirty-two per cent. were of that complexion. He denies, however, also the alleged frequency of the tumid lip and alæ nasi, as asserted by Lugol, as well as the intellectual precocity of scrofulous children. He denies, in fact, in distinct terms, that a child can ever be, with propriety, considered scrofulous up to the moment of deposition of scrofulous matter. This scrofulous matter is believed by Mr. Phillips to exist in the blood as such prior to its separation, but he admits his inability to adduce ocular demonstration of his opinion; chemical examination of that fluid, which he has instituted in sixty-seven cases, merely exhibits a looseness of the coagulum, with diminution of the globules and other changes, rather depending upon debility in general than the influence of the scrofulous habit.

A chapter is devoted to a very important point in the history of scrofula, viz., its identity with tuberculous disease. That the two products are essentially the same is admitted by the great majority

of pathologists, and is, we believe, the correct opinion. Lugol even goes so far as to assert that pulmonary tubercle is the *natural death* of the scrofulous; and Mr. Gulliver determines by the microscope that scrofulous and tubercular matter are so precisely similar, that it is impossible to distinguish them. On the other hand, Mr. Albers conceives that the differences are readily demonstrable; and M. Lebert is of the opinion that they are analogous, but not strictly identical products. The latter opinion is the nearest approach to that held by the author. The grounds upon which he founds his disbelief in the identity of the scrofulous deposit and tubercle are, the different periods at which the two diseases,—scrofula and pulmonary tubercle,—destroy life; the difference in the proportionate invasion of the two sexes: and the difference in the relative frequency of the two diseases.

The causes of scrofula are investigated under the following heads:—1. Hereditary influence. 2. The power of other diseases in the parent, and more particularly of the syphilitic taint, to give rise to scrofula in the offspring. 3. Influence of conception during menstruation. 4. Influence of the age of parents. 5. Influence of frequent intermarriages. 6. Influence of the milk of a scrofulous nurse. 7. Contagion. 8. Influence of food, impure air, climate, electricity, light, humidity, temperature, occupation, &c. The opinions of the author on each of these points may be thus briefly recapitulated:—

The influence of a scrofulous parent in transmitting the scrofulous predisposition is real, but of limited extent; and it does not appear that the scrofulous habit in the parent is more efficient in inducing scrofula in the offspring than is an equal amount of constitutional debility arising from other causes; in other words, a sickly parent is less likely to procreate a vigorous child than a healthy parent, and a weakly child is more susceptible of scrofula than a more robust one.

The author's opinions on the influence of immature years or great age in the parents, may be stated in the same general terms; the child of such is liable to be weakly, but is not, he thinks, more exposed to scrofula than children weakly from other causes.

There is no proof of the inoculability or contagiousness of scrofula.

Climate and temperature bear no definite relation to the

occurrence of scrofula; neither does the mortality from scrofulous disease bear any direct ratio to the closeness of population.

Particular occupations and social conditions have greater influence on the general health than impure air *per se*, but they have no specific effect in producing scrofula,

Diseased nutrition is the cause of scrofula, but this diseased nutrition originates in various ways. Thus the congenitally weakly child may owe this condition to an impaired digestion, or the impaired digestion may be due to occupation, the respiration of impure air, &c. But the cause of diseased nutrition generally is insufficient food or improper feeding. Abundant and wholesome food will, in the author's opinion, negative the power of other injurious influences; and, on the other hand, the purest air and the most healthy occupation will not obviate the tendency to scrofula, where food is insufficient in quantity or quality.

The *treatment* of scrofula is the next subject considered; and, in accordance with general custom, is divided into prophylactic and curative. The section on the former portion is exceedingly judicious, and contains rules respecting the feeding of infants and their subsequent education, which, though in nowise new, are worthy of attentive perusal.

The medicinal treatment, which is very briefly mentioned, includes, principally, the use of mercury, iodine, barytes, sea-water, mineral waters, and alkalies. Mercury is justly stated to be unworthy of confidence. The efficacy of iodine is considered to be greatly exaggerated, and even when it does prove of service, its benefit is referred to its power in "modifying the mucous surfaces," and not to any specific anti-scrofulous action. The barytes, first recommended by Crawford, is, according to Mr. Phillips, little inferior to iodine, though its sphere of usefulness is more limited. It is chiefly applicable where the pallid complexion and languid circulation are accompanied by irritability of the mucous membranes. Mr. Phillips gives it in doses from half a grain to three grains in the day, never exceeding the latter dose. With respect to the beneficial influence of sea air in scrofula, Mr. Phillips is sceptical; he considers that the same advantages would accrue from simple change of air. The same want of confidence is expressed as regards the mineral waters.

In the treatment of the various forms of scrofulous disease, the

use of the *muriate of barytes* has been revived by Dr. A. J. Walsh, but his testimony, like that of Mr. Phillips, is not such as to place it in a very favourable light as a therapeutic agent. *Cod-liver oil*, so highly valued by the Germans, appears to be gaining ground in the estimation of British practitioners, as an anti-strumous remedy. My own experience leads me to think very favourably of it. The *extract of the green walnut shell* is much used in various parts of the continent as a substitute for iodine and other more expensive medicines. It has lately been favourably mentioned by Negrier and M. Sandrat.*

Gout.—Dr. Robertson,† of Buxton, has recently published a work upon gout, which will be found of considerable value as a book of reference to those who are much engaged in the treatment of this once fashionable complaint. It is many years since an extended work upon gout has made its appearance; and it would seem from this, either that the disease has become more rare, or that the principles of its treatment are so well established as not to stand in need of further elucidation. It will, however, be made apparent by a perusal of Dr. Robertson's volume, that the light thrown upon this, in common with other diseases, by chemistry, has made it requisite to be considered under new aspects; and we think that it will be conceded that the author has, in this respect, given a value to his labours greatly superior to that of former treatises upon the subject.

A new remedy for gout as well as for rheumatism has been introduced by Dr. Buckler,‡ of Baltimore, in the *phosphate of ammonia*, which he exhibits upon the principle of its forming two soluble salts,—the phosphate of soda and lithate of ammonia, by the decomposition of the insoluble lithate of soda. Cases are given in which it was apparently of marked service, in the dose of from ten grains to one drachm every six hours.

Rheumatism.—Having, in a former part of this Address, alluded to the serious importance of rheumatism in reference to the pro-

* *Encyclographie des Sciences Médicales*, Aôut, 1845; *Half-Yearly Abstract*, vol. ii., p. 55.

† *Nature and Treatment of Gout*, London, 1845.

‡ *American Journal of the Medical Sciences*, January, 1846.

duction of diseases of the heart, it is quite unnecessary to claim your attention to recent experience in its treatment. For much practical information upon this subject, we may refer to Dr. Latham's first volume of clinical medicine, already quoted, in which he takes a survey of the therapeutic means in most common use. Of these he regards blood-letting, as it is sometimes employed in the treatment of rheumatism, to be of doubtful efficacy, if not positively injurious, and as a remedy rather to be considered of secondary than primary value. Colchicum is thought by him to be insufficient in itself in urgent cases; but he believes it to be a valuable remedy in cases of relapse. This medicine is always exhibited by him in an uncombined state. He places the greatest confidence in the continuous use of mercurial and other purgatives, regulated by the strength and other circumstances of the patient.

Dr. Corrigan* has employed with success a new method of producing counter-irritation in lumbago and muscular rheumatism of other parts of the body. The method consists in a species of "firing," which is performed with an iron instrument with a button-shaped extremity, heated to the temperature of boiling water. This instrument is applied for a few minutes to many points of the affected part in succession. The pain is described as trifling, and the only visible effect produced is a slight reddening of the integument.

Among other remedies in chronic rheumatism we may mention those of galvanism, which has been found eminently successful by M. Raciborski,† and cod-liver oil, which is favourably spoken of Dr. Bradshaw.‡

Arthritis in Paralytic Limbs.—Dr. Scott Alison§ has described a variety of rheumatism, which he considers peculiar to the joints of paralytic limbs. He believes the disease to depend upon the reduced vitality of the parts affected, together with the presence of noxious principles in the blood.

Diabetes.—Although the more recent investigations into the pathology of diabetes mellitus tends to the conclusion that it

* *Dublin Hospital Gazette*, March 1, 1846.

† *Gazette Médicale.*

‡ *Provincial Medical and Surgical Journal*, December 31, 1845.

§ *Medical Gazette*, March, 6, 1846.

originates in a defective condition of the stomach or other organ concerned in primary assimilation, I have ventured to defer the consideration of the disease to the present section, under the impression that the obscurity which surrounds its phenomena is not sufficiently cleared up to allow of our fixing its precise nosological position.

In two fatal cases reported by Dr. Percy*, of Birmingham, the stomach has been submitted to microscopical scrutiny by Messrs. Goodsir, Busk, and Bowman. In the first case Messrs. Bowman and Goodsir were unable to discover any lesion of the stomach, but Mr Busk, by examining it side by side with a healthy organ, found the following differences:—In the mucous membrane itself, and in the epithelium cells, no distinction could be made out between the diabetic stomach and the healthy one, but in the viscid mucus of the former numerous minute confervoid sporules were observed together with fragments of a confervoid mycelium, apparently produced from similar sporules. In the mucus of the non-diabetic stomach nothing of the kind was perceptible, but it contained an immense number of actively moving vibriones.

In the second example Mr. Busk ascertained the presence of the same confervæ and sporules in the gastric mucus; it would appear, therefore, that there is some connection between diabetes and the development of these low vegetable organisms.

In a *post-mortem* examination of a diabetic patient detailed by Dr. Benson,† the stomach was likewise the only organ in which any lesion existed which could reasonably be considered as the proximate cause of the disease. It is to be regretted, however, that no microscopic examination was in this instance instituted.

The supplementary part of the *Annuaire de Thérapeutique* of the present year contains an elaborate memoir upon diabetes by M. Bouchardat,‡ in which the disease is minutely investigated under its various aspects. The essay is too long for a detailed exposition in the present place, we shall, therefore, briefly recapitulate its leading features.

Diabetes is assumed by Bouchardat to be a disease depending upon the presence in the stomach of a peculiar principle, called

* *Medical Gazette*, February 13, 1846.

† *Dublin Medical Press*, April 29, 1846.

‡ A condensed translation of this important memoir may be found in the *Half-Yearly Abstract*, vol. iii., p. 190.

"diastase," in virtue of which amylaceous matters, which in a healthy stomach pass incompletely digested into the intestines, are in this class of patients readily converted into sugar in the stomach. That this difference in the digestion in the diabetic and healthy stomach really exists, he has ascertained by causing patients to vomit a few hours after eating food containing starch, when he finds that the diabetic stomach contains abundance of sugar, but the healthy stomach is entirely free from it.

Respecting the presence of sugar in the blood of diabetic patients, a point on which a difference of opinion exists even at the present time, the observations of the author are extremely interesting, as they tend to reconcile the contradictory statements of different experimenters. He has ascertained that the presence or absence of sugar in the blood depends entirely upon the length of time which has elapsed between the examination and the last meal, and affirms that if the precaution be taken to experimentalize upon blood drawn not later than from two to three hours after a repast, sugar can be readily detected; later than this, it has passed from the blood into the renal secretion.

In the treatment of the disease M. Bouchardat considers hygienic measures of the first importance, but he condemns the practice of entirely suppressing amylaceous food without providing a substitute. He remarks that these substances belong to that class of products which supply fuel for the respiratory process, and that it is therefore necessary to supply their place with other articles of the same character, but not convertible into sugar. Of these he mentions oils and alcohol, which he exhibits in combination with meat and other protein compounds. Of alcoholic beverages the author prefers old claret or Burgundy.

Medicinal agents appear to M. Bouchardat to exercise but a secondary influence over the disease, but of these he considers the carbonate of ammonia, long since advised by Dr. Barlow, as the most trustworthy. Among the agents supposed to be capable of preventing the saccharine conversion of starch, the author mentions the caustic alkalies, alkaline earths, mineral acids, alum, and tannin.

Dr. Benson places more reliance in the treatment of diabetes on acetate of lead and opium than on any other combination. Mialhe,* who believes the proximate cause of the disease to be a deficient

* *Mémoires de l'Académie des Sciences*, Paris; reported in the *Medical Times*, April, 11, 1845.

alkalinity of the blood, urges the advantage of alkalies. Dr. John Aldridge* advises the use of the balsams, strychnia, and of ammonia when, as is commonly the case, the functions of the skin are suppressed, and chalybeates and metallic astringents if, as is sometimes the case, perspirations are excessive. Of the chalybeate preparations M. Bouchardat gives the preference to the hydrated peroxide, made by passing a stream of hydrogen through a tube heated to redness, containing the black oxide of the iron. This preparation has the advantage of readily combining with weak acids, such as those formed during the process of digestion.

SECTION IX.—DISEASES OF THE SKIN.

The diseases of the skin have been illustrated during the past year by communications of variable interest, and by one or two monographs of a more extended nature, but narrowing space compels me to content myself with a simple enumeration of the titles of the more important of these. Among these we may refer to an essay on "The General Principles of the Treatment of Skin Diseases," by M. Devergie;† one on "The Application of Local Remedies in Skin Diseases," by M. Cazenave;‡ a report on pellagra as it has recently appeared in the south of France, by M. Jolly;§ another on the same by M. Thouvenel; on "The Syphilitic Diseases of the Scalp," by Mr. Acton;‖ on "The Treatment of Chronic Diseases of the Skin," by Mr. Hunt;¶ and, lastly, a series of essays by Mr. Erichsen.**

M. Gibert's work on the special diseases of the skin has been translated by Mr. Sheppard, and will be found a valuable manual for the student and senior practitioner. Mr. Wilson†† has written a work on the means of maintaining a healthy state of the skin,

* *Lectures on the Urine*, p. 79.

† *Bulletin de Thérapeutique; Half-Yearly Abstract*, vol. i., p. 61.

‡ *Encyclographie des Sciences Médicales*, Septembre, 1845.

§ *Bulletin des Académies*, Aôut, 1845.

‖ *Lancet*, January 3, et seq., 1846.

¶ *Lancet*, January 10, 1846.

** *Medical Gazette*, February, 1846.

†† *Practical Treatise on the Healthy Skin*, London, 1845.

containing much that is interesting to the medical as well as the general reader. We may mention, also, that a work in parts, illustrated by magnificent plates, is in course of publication, by M. Cazenave.* Some few communications have likewise been made upon the individual diseases of the integument, which we shall proceed shortly to notice.

Eczema.—M. Devergie† has described a new variety of eczema, which he calls "nummular" eczema. This species may be general or local, and is in both cases difficult of eradication. It declares itself in the form of small patches of vesicles, varying in size from that of a shilling to that of a crown-piece. The secretion is not abundant, and it is distinguished from herpes by the absence of an inflammatory zone. The author has found it most readily combatted by an ointment of the biniodide of mercury.

In very acute cases of eczema, M. Trousseau strongly recommends mercurial baths, prepared by adding from three to four scruples of corrosive sublimate to fifty or seventy quarts of water. He states that he has used these baths, even in the cases of children, without ever having witnessed any injurious effects.

Scabies.—Dr. Burgess‡ informs us that he has had opportunities of assisting at some interesting researches into the history of the Acarus scabiei, and the treatment of the complaint to which this animal gives rise. Several patients were removed from the wards of the hospital in which the experiments were instituted, and placed at the disposal of M. Bourguignon, who conducted the examination. The hands of the patients, after being thoroughly washed with soap and water, were examined under the microscope, and one patient was selected in whom the disease seemed to be the most pronounced. Several acari were removed from each hand, and when examined by the microscope seemed active and vigorous. The hands of this patient were then immersed in two vases filled with a strong alchoholic extract of stavesacre, and there retained for half an hour. The hands were now examined by the microscope, and several acari were removed. In this instance

* *Leçons sur les Maladies de la Peau.*

† *Annuaire de Médicine*, 1846.

‡ *Journal de M. Trousseau* and *Medico-Chirurgical Observations*, April, 1846.

the remedy was not entirely effectual, as some of the acari were still alive. The remedy was again applied for half an hour, when not a single living acarus was discovered; they were examined under the microscope, and showed no signs of life. On the following day, the same experiment was repeated on another patient, using the same precautions, and with the same success, for on examining the acari, not the least sign of life was discovered in any. The patient was examined again on the following day. He said he was entirely free from itching; the skin was paler, and there was no living acarus found in the parts to which the extract had been applied. The author states he has satisfied himself that it is not the alcohol that destroys the acarus, for when used without medication it has not succeeded. He concludes by referring to the advantages presented by this mode of treating itch over the ordinary treatment, viz., rapidity and cleanliness.

Mr. Stiff affirms that the sulphur contained in the common itch-ointment is an unnecessary adjunct, and the cure is in reality due to the oleaginous ingredients, which destroy the acarus by closing its spiracula. In proof of this, he states that he has cured more than forty cases by simple inunction with lard.

Black Secretion from the Skin.—Mr. Teevan brought before the Medico-Chirurgical Society the following remarkable case:—A young lady, fifteen years of age, was affected with a black discoloration of the forehead and upper part of the face. The discoloration was first observed on the left under eyelid, near the internal angle of the eye, first appearing as a brown spot, which gradually assumed a jet-black colour. The discoloration never appeared on other parts of the body; and on the forehead was accurately limited by the hair. By the use of soap and water, Mr. Teevan was able to remove sufficient of the black pigment to darken four basins of water as black as Indian ink. Under the idea that there was some imposition in the case, the patient was scrupulously watched after the matter was removed, when it was satisfactorily ascertained that it was a real secretion from the skin. During the period of Mr. Teevan's attendance the patient vomited a black fluid, which was found by Dr. Rees to be identical with that secreted by the skin of the forehead. The treatment pursued did not appear to have the least effect upon this singular case, but it

subsided spontaneously after an attack of very severe colicky pains in the bowels. An analysis by Dr. Rees declared the matter to be chiefly composed of carbon.

Prevention of the Cicatrices of Small Pox.—M. Goblin confirms the advantage of mercurial inunction as a preventive of the unseemly cicatrices left by the small-pox pustule. The inunction is commenced as soon as the pustules are developed, the quantity of the ointment being proportioned to the confluence of the eruption. The application is to be persisted in until desquamation commences.

Dr. Corrigan recommends the Emplastrum Plumbi melted with almond oil for the same purpose. The compound is allowed to dry and to remain until it is detached by desquamation. M. Rilliet and M. Barthez make use of a pommade, consisting of twenty-four parts of mercurial ointment, ten of yellow wax, and six of black pitch. Both these applications are stated by their respective partisans to be effectual in attaining the intended result.

PART III.—MATERIA MEDICA AND THERAPEUTICS.

Endermic Medication.—The endermic application of various medicinal substances offers a resource of great value not only in local affections, for which it has been more generally employed, but also in other more deeply seated maladies when, from accidental circumstances, their internal exhibition becomes inadmissable. The action of anodynes endermically applied is familiar to us all, but it may not be so generally known that purgatives and quinine have been found to act with equal efficacy when applied to a blistered surface as when administered in the ordinary way.

M. Salques details three cases in which powdered colocynth sprinkled upon a blistered surface produced free evacuation of the bowels. The irritability of the stomach was such as to forbid the internal use of medicine, and enemata had been used without effect.

Endermic use of Morphia in Painful Swelling of the Joints.—Dr. Thomson* has found blistering the joint and afterwards

* *London and Edinburgh Monthly Journal*, October, 1845.

sprinkling it with a grain or two of morphia, of great service in an apparently rheumatic affection of the knee-joint, accompanied by swelling and excessive pain. The application causes considerable smarting, and sometimes induces a pustular eruption in a distant part of the body, but the relief is described as very decided.

Aconite.—Separate works on the action and natural history of particular medicines are unfortunately rare; were it not so, we should have less often to complain of the uncertainty or narrow limits of our knowledge respecting the agents to which we in many cases so blindly trust in the treatment of disease. It is with pleasure, therefore, that we have to notice Dr. Fleming's work on the physiological and therapeutic action of aconite, which is, in truth, a most interesting and valuable addition to our knowledge of Materia Medica.

The physiological effects of the drug on the human subject are shown to exist under four degrees of severity. The first effect of five minims of the tincture appears to be sensation of warmth in the stomach, sometimes accompanied with nausea and an oppression of the breathing. After a few minutes the feeling of warmth becomes more generally diffused, but the pulse falls at the same time both in tone and frequency.

Should a dose of ten minims have been given at first, or the former dose have been repeated within a period of two hours, these symptoms supervene with greater rapidity. The pulse will have fallen in a short time to about 56 beats in the minute, and become exceedingly feeble, without losing its regularity. A kind of lethargy also ensues, and the extremities lose their warmth. This is the utmost extent to which Dr. Fleming thinks it safe to push the therapeutic action of the drug.

On the exhibition of a third dose of five minims the warmth and tingling and numbness is again renewed, and the sensibility of the body becomes further depressed. The patient also now begins to complain of vertigo and dimness of vision, and his muscular power is seriously prostrated. At this time the pulse sometimes falls as low as 36, but more commonly rises to 70 or 80, and becomes slightly irregular. The respiratory movements likewise become unequal and sighing.

A repetition of the dose induces symptoms of a still more

alarming character, and, as was lamentably exemplified about the period of our last meeting in the case of Dr. Male, of Birmingham, irremediable prostration is apt to ensue. The patient eventually dies in a state of syncope.

The therapeutic action of the aconite may be deduced with tolerable certainty from a consideration of the above physiological effects.

From its action upon the nervous system, Dr Fleming infers:—

1. That it is calmative and anti-spasmodic.

2. That it is an advisable antiphlogistic in apoplexy, phrenitis, or other diseases in which the cerebral circulation is excited.

3. That it is contra-indicated in cerebral symptoms, arising from anæmia.

4. That its properties point it out as a useful remedy in spasmodic and convulsive affections.

Its action on the circulation point it out—firstly, as a powerful antiphlogistic; secondly, as a remedy in all cases accompanied by inordinate activity of the circulation; and thirdly, that it is contra-indicated where there is obvious mechanical impediments to the passage of the blood through the heart or large vessels.

The practical inferences from its action on the respiratory system are stated to be—1. That it will be found an advantageous antiphlogistic in pneumonia, pleurisy, &c., as well as in spasmodic asthma. 2. That it is contra-indicated in dyspnœa, arising from other causes than inflammation or spasm. 3. In bronchitis, with profuse secretion, it should be avoided, from its tendency to diminish the powers of expectoration.

The preparation of aconite preferred by Dr. Fleming is the tincture, of which the dose is five minims twice or three times a-day. This dose should not be increased by more than one minim at a time.*

Cannabis Indica.—Lieautaud† has communicated a series of experiments upon the Indian hemp, in the main confirmatory of the accounts given by O'Shaughnessy and other Anglo-Indian

* Formula for the tincture:—Root of Aconitum Napellus dried and powdered, sixteen ounces troy; rectified spirit, sixteen ounces: macerate four days, and percolate; add spirit until twenty-four ounces of tincture are obtained.

† *Repertorium für die Pharm. Band* 37, heft ii.; and *Half-Yearly Abstract*, vol. ii., p. 438.

writers. As, however, his observations contain little that is calculated to advance our knowledge of its medicinal action, the paper need not be further alluded to. From the tenor of several narratives of cases of tetanus, published during the past year, it would appear to be one of the most trustworthy narcotics in that fatal disease.

Conium.—A series of experiments has been performed upon himself by Dr. Earle, for the purpose of determining the physiological effects of this plant. The dose taken was as high as sixty grains, repeated three times within the twenty-four hours; but no very decided effects appear to have been induced beyond a feeling of vertigo and dimness of vision. As a soporific, conium appears to be nearly inert.

Dr. Manlucci* relates a case in which conium appears to have been efficacious in the destruction of tape-worm. In the first instance alluded to, an infusion was given by mistake for valerian, and produced great giddiness and prostration, but was speedily followed by the expulsion of a large tænia. In the second, that of an infant, the worm was destroyed by three grains of the powdered leaves.

Quinine and its preparations.—Quinoidine.—When we consider the high price of the sulphate of quinine, and its indispensability in the treatment of many forms of disease, the discovery of its existence in an amorphous state, which can be supplied at a cheaper rate, but of equal efficiency with the sulphate, must be deemed an important one. The amorphous quinine, or quinoidine, as it has been called by Sertuerner, who was the first to ascertain its properties, is prepared, under the form of a resinous mass, from the mother liquor of the sulphate of quinine. This substance has recently been analyzed by Liebig, with the result of determining that it is in every respect equal to quinine, the only difference being that it exists in a non-crystallized state. It appears that there is considerable difference in the quantity of quinine in different specimens of quinoidine, and it is, therefore, a matter of importance to obtain the article in a state of purity. In order to ensure this, a patent has been taken out by a London chemist,

* *Annali Universali*, Mars, 1845.

a proceeding which, although in one respect it may be advantageous, has the disadvantage of raising the price.

M. Ducros* has observed a singular circumstance in connection with the administration of the ordinary sulphate. He states that when employed as a lotion to the velum palati and pharynx, it produces, in doses of less than a grain, an abundant salivation. This action is said to be exceedingly rapid, and more powerful than that of a scruple dose taken internally, and is, therefore, recommended in those severe remittents and intermittents in which it is advisable to establish its peculiar anti-periodic influence.

The tendency of quinine to produce abortion has been noticed by M. Petit Jean† so frequently that he states his conviction that it is unsafe for that reason to exhibit it in intermittents occurring in pregnant women.

Arseniate of Quinine, first prepared by M. Bourières,‡ has been much used in France in the treatment of intermittent diseases. The dose is one to two grains in divided doses during the day.

Valerianate of Quinine.—Dr. Castiglione adds fresh testimony to the virtues of this combination in neuralgic and hysteric affections. The dose was half a grain every two hours.

The Tannate of Quinine has been exhibited by Dr. Hauff, and appears to possess properties of an analogous character.

Glycerine.—This term has been applied to an uncrystallizable fluid, of the consistence of syrup, which is obtained in the process of making litharge plaster.

The probability of this substance proving a useful application in some forms of cutaneous disease, appears first to have occurred to Mr. Startin, who has described its effects in a lecture on the squamous eruptions, reported in the *Medical Times,* February 7th. Its usefulness depends most probably on its property of resisting evaporation, even at a considerable temperature. Mr. Startin says that a common plate wetted with it may be kept in an oven, side by side with a joint of meat, till the meat is cooked, without any sensible diminution in the quantity of the liquid. Hence, when applied to the skin, it remains moist, forming a coating or varnish,

* *Half-Yearly Abstract,* vol. iii. p. 364.

† *Gazette des Hôpitaux,* No. 97.

‡ *Annales de Thérapeutique,* 1846.

not distinguishable from the ordinary secretion of the part. A lotion composed of half an ounce, with ten ounces of water, effectually prevents the skin from becoming dry. When used pure it makes the part stiff and uncomfortable, so it answers best diluted. It is also added with advantage to poultices, and even to baths. Mr. Startin speaks of its use chiefly in psoriasis, pityriasis, lepra, and icthyosis, in all which he describes it as producing excellent palliative effects. He promises to give to the profession ere long the results of experiments he is carrying on to determine its virtues in various forms of cutaneous diseases, and in the meantime he invites his medical brethren to make trial of it in their practice, and to communicate to him the results. As from the ascertained properties of this substance, there is good ground to think that Mr. Startin's account of its advantages, as well as his expectation of a more extended utility, will turn out to be well founded, it is therefore, desirable to publish his invitation to his medical brethren as widely as possible.*

Cod-liver Oil.—This recent addition to our therapeutical resources is now undergoing examination by various competent observers. In an essay lately published by Mr. Donovan,† its uses appears to have an extended range, including every variety of scrofulous disease, and some forms of ophthalmia connected with debility. In phthisis pulmonalis, according to Dr. Theophilus Thompson,‡ it has powers which he has not observed in any other medicinal agent; and from what I have individually observed of its action in that disease, I am inclined to believe that the statement is in nowise an exaggerated one. Dr. Bradshaw§ has also recently acknowledged its usefulness in chronic rheumatism.

Ox-gall.—The utility of the inspissated bile of the ox in certain states of the digestive system seems now established, mainly through the experimental inquiries of Drs. Clay and Allnatt. The former writer has recently published a series of cases, which add still further to the medical reputation of the article.||

* *Report on Materia Medica*, in *Half-Yearly Abstract*, vol. iii., p. 374.

† *Dublin Journal*, September, 1845.

‡ *Vide supra.*

§ *Provincial Medical and Surgical Journal.*

|| *Practical Observations on the Use of Ox-gall.*

In concluding this portion of the retrospect of the past year, I think it will not be out of place to call your attention to a very superior method of preparing various specimens of the dried leaves and other parts of medicinal plants, adopted by an intelligent surgeon of my neighbourhood, and, I believe, a member of this Association, Mr. Kent, of Stanton.

I need not point out to you the great importance of obtaining preparations of medicinal herbs of an uniform strength, or remind you how much the results of treatment depend upon this circumstance, and how unjustly, in some cases, the practitioner may be blamed for the inertness or over-potency of medicines, for the preparation of which he is obliged to trust, in many cases, to the hands of ignorant or rapacious persons. It occurs to me, therefore, that in pointing out to you the means of obtaining your medicinal vegetable preparations, from a gentleman who is not only familiar with the external characteristics and medicinal effects of the plants upon which he manipulates, but has also made the ascertaining the proper time of gathering, the best means of drying them, &c., his special study, I may be the means of directing you to a really valuable resource; for knowing the frauds and adulterations which are indulged in by unprincipled herbalists and druggists, I am certain you will gladly avail yourself of Mr. Kent's pharmaceutical labours. An inspection of his extracts and powders, (preparations of which were exhibited,) and especially those of digitalis, conium, white poppy, &c., will at once convince you of their superiority to those in common use.

BIBLIOGRAPHY.

The greater number of works of value published during the period embraced by this Address have already been incidentally mentioned; it remains for me, therefore, only in the briefest manner to allude to such others as may be worthy of your notice.

Under the heads of anatomy and physiology it may be observed that Dr. Todd has published an admirable description of the brain, spinal cord, and ganglions, adapted for the use of students; and that Dr. Baly has added an important appendix to his translation

of *Müller's Physiology,* in "An Account of the Advances made during the last Three Years in the Physiology of Generation and Development."

As anatomical text-books the *Elements of Anatomy,* by Mr. Alexander Lizars, and *First Steps to Anatomy,* by Dr. Dummond, of Belfast, deserve attention. It is needless to pay any tribute of praise to the *Manual of Physiology,* recently published by Dr. Carpenter, the author's name being a sufficient guarantee of its excellence. The physiology of the nerves of the uterus is illustrated in a small pamphlet by Mr. Joseph Swan.

In general pathology, in addition to the treatises of M. Lebert, M. Hasse, and Dr. Walshe, lately mentioned, we may draw your attention to a recent work by M. Günsburg, the first volume of which has reached this country, under the title of the *Doctrine of Pathological Tissue.* (*Die Pathologische Geweblehre.*)

Mr. Hassal's *Microscopical Anatomy,* which appears in monthly parts, will be found to afford an excellent and facile acquaintance with a department of study which is daily acqniring fresh importance. Four numbers of this work have already been published, and have issued from the press with a regularity which may advantageously be imitated by those medical works of a similar method of publication. They contain a minute description of the microscopic appearances of the blood and secretions, all of which are illustrated in coloured lithographic drawings.

Vogel's admirable treatise is also shortly to appear in an English dress by Dr. Day, and having had a view of the proof-sheets, we are able to pronounce that the value of the original is in every respect maintained in a fluent and correct translation.

The dictionary of Dr. Copland is proceeding to its termination with as much rapidity as the stupendous character of the undertaking admits of; nor do the energies of the untiring editor flag for one instant in the arduous task, the last number being distinguished by research as careful, and a digestion of matter as complete, as are exhibited in any of the earlier parts of the work.

In the *Notes and Recollections of a Professional Life,* by the late Dr. William Ferguson, and the *Medical Notes on China,* by Dr. Wilson, we have evidence that our brethren in the two services are not behind their more peaceful compeers in energy and general scientific information. In both the above works there is to be

found not only excellent accounts of the various diseases incidental to tropical climates, but much that is interesting also to the general reader.

Gentlemen, I will now bring this lengthened Address to a close by thanking you for the patience with which you have listened to me. No one can be more alive than myself to its imperfections. Many things which it contains may appear to have been invested with an undue interest; on other points I may be thought to have erred on the side of omission, in failing to notice what to some of you may have appeared worthy of commemoration; but I feel confident that, in the majority of your numbers, I shall find lenient critics, and if there should be any who are inclined to be severe on the score of imperfections or tediousness, to them I would reply,—"*Ego petentibus scripsi, gratis non invidis, studiosis non oscitantibus.*"

A CASE OF

LARGE SECONDARY PROSTATIC CALCULUS,

REMOVED BY PERINÆAL INCISION.

BY T. HERBERT BARKER, M.B., LOND.,

Fellow of the Royal Medical and Chirurgical Society, Member of the Royal College of Surgeons of England, and formerly House-Surgeon of the University College Hospital, London.

John M——, of Harrowden, near Bedford, aged twenty-six, farmer's labourer, sent for me on the 25th of October, 1843. He was labouring under complete retention of urine, and complained of considerable pain in the urethra and perinæum. On examination the penis was found to be very œdematous, with a fistulous opening on its under surface and towards its left side, about three inches from the extremity, from which a small quantity of purulent fluid was discharging. This opening first made its appearance about four days ago, followed by the escape through it of a considerable quantity of urine; but during the last twenty-four hours urine had also ceased to flow through this opening.

The perinæum presented some tumefaction and slight redness of the soft parts. On making firm pressure in its centre near the anus, a deep-seated hardness could be felt; and on attempting to move this hardened base from side to side, some degree of crepitation could be detected, as if produced by the limited movement of calculi firmly impacted together. On introducing a finger into the rectum, considerable enlargement was felt in the region of the prostate gland, and similar crepitation was also felt as far

as the finger could reach in that direction. On introducing a probe into the fistulous opening, it passed readily about an inch and a-half backwards and inwards towards the urethra, but it could not be brought into contact with any hard substance.

All that could be learned of his previous history was, that since he had been four years of age he had laboured under incontinence of urine, which had rendered him very offensive to society, and had long since induced him to abandon it as much as possible. Some years ago he had been a patient in the Infirmary, but without any relief. He had never suffered *very severe* pain, nor from retention of urine before the present attack, and urine had never flowed through any other than the natural channel before the formation of the fistulous opening four days before.

He was directed to maintain the horizontal position, to use fomentations of warm water, to drink as sparingly as possible, and to take simple aperients. His mind was prepared for the probable necessity of removing the calculi on the following day.

October 26th, Eleven a.m.—Visited him with my pupil, found him in the same state in which he had been left on the preceding day, and again made a careful examination of the perinæum and per rectum, which ended in the thorough conviction of the presence in the posterior part of the urethra of several calculi of large size. Another attempt was made to pass the probe further backwards through the fistulous opening, but with the same result.

Having procured the assistance of a strong man in the neighbourhood, to sit behind and hold my patient, he was placed in the position for lithotomy, and the calculi were removed in the following manner:—The perinæal integuments were rendered tense with the left fore-finger and thumb, and an incision made through them together with the superficial fascia, two or three lines to the left of the raphe, commencing about two inches and a-half from the anterior margin of the anus, and terminating within half an inch of this margin. On introducing the point of the finger into the incision, the calculus could be readily felt, and was cut down upon with the point of the bistoury, and the intervening soft parts were divided upwards and downwards to the entire extent of the first incision.

Observing that the several portions of the calculus were firmly wedged together, and that it was impossible, from its size, to

remove it *en masse,* a lateral movement of the portions within view was had recourse to by means of the finger and thumb, for the purpose of loosening them, and with little difficulty the pieces forming the anterior narrower part of the calculus were removed, and some of those constituting the posterior and broader portion were disintegrated. Having brought away several fragments with the fingers, others were grasped by the forceps and removed; but finding considerable difficulty in loosening three or four remaining portions, the left fore-finger was introduced into the rectum, for the purpose of dislodging them from the prostatic part of the urethra, which being done, they were seized by the forceps and removed. The dislodgement of these last portions of the calculus was followed by the escape of a small quantity of urine. Having satisfied myself by careful examination that no calculi were left behind, the parts were sponged, three points of interrupted suture were introduced, the perinæum was covered with lint, and my patient put into bed. He was directed to have but spare diet.

Ten p.m.—Comfortable; free from pain. A mild opiate draught.

27*th.*—Free from pain, but suffering some anxiety in consequence of the place "*having burst;*" urine had accumulated in the cavity which had been occupied by the calculus, and had at length escaped between the sutures. There is very slight tumefaction of the perinæum, and the œdema of the penis has somewhat subsided. The discharge from the original fistulous opening in the penis is very slight. An opiate at bed-time.

29*th.*—The wound is going on very favourably; urine escapes through the lower end of the incision. Removed the interrupted sutures. From this period to the next date he went on favourably, and the wound healed, with the exception of about half an inch of the lower extremity of the incision, through which the urine continued to flow.

November 13*th.*—A catheter was introduced into the bladder, through the entire length of the urethra, and secured in the usual manner. Two needles were introduced through the parietes of the unhealed part of the incision, which were brought together as accurately as possible by the twisted suture. He was directed to remain in the supine position.

14*th.*—The urine has escaped through the catheter. The instrument was withdrawn, and he was directed to remain undisturbed.

16*th*.—Urine dribbles away per urethram. The needles were removed, and he was directed to remain as quiet as possible.

From this period the urine escaped by the urethra, but he was unable to retain more than about an ounce at a time. The wound healed soundly, and he went to work in eight weeks after the operation.

The calculi were *twenty-nine* in number, and weighed *three ounces, four drachms, and one grain, or* 1,681 *grains*. They are of a whitish colour and porcelainous lustre and hardness; indeed, the latter character is so well marked that it is with some difficulty that any impression can be made upon them with a knife.

The entire calculus was composed of these several portions closely cohering by curved faces, so that on any violence being applied to the mass it would readily break up, each portion presenting a conchoidal lustrous surface.

One of the largest calculi was forwarded to Dr. Golding Bird, for the purpose of being submitted to a chemical examination. That gentleman remarks, in a note dated January 23, 1844:—

"Had I seen this calculus without receiving any history, I should at once have pronounced it prostatic, and such at this moment I suspect to have been its origin.

"My own view of the origin of this very curious form of concretion is, that the calculous material is deposited in cells connected with, or forming part of, the prostate gland, and that these enlarge as an increase in the amount of calculous deposit occurs, until the walls of the cells become exceedingly attenuated and ultimately destroyed. By the cohesion of calculous masses, deposited in adjoining cells, the whole concretion is built up so loosely, however, that a slight blow will cause it to be disintegrated into its several component portions.

"The calculus is identical in composition with the concretions occasionally found in glandular structures, (as salivary, bronchial calculi, &c.,) consists of phosphate of lime, with a rather larger proportion than usual of the ammoniaco-magnesian phosphates."

Dr. Golding Bird also states that an exactly analogous specimen exists in the extensive collection at Guy's Hospital. (No. 2148.)

I wrote to Professor Owen concerning the existence of any similar calculus in the museum at the College of Surgeons, and through the kindness of that gentleman, am enabled to give the

following facts relating to the largest of this kind of calculus in that collection. "The largest prostatic calculus, though divided into four parts which were separate in the prostate, may be regarded as a single one, as the four pieces, one large and three small, were co-adapted by smooth surfaces.

"The weight of this quadrifid calculus is 575 grains. It is what may be termed a secondary prostatic calculus, being composed of salts deposited from the urine, not from the prostatic secretion; the salts being the mixed phosphates with a little urate of ammonia and carbonate of lime. The specimen is No. H, 13, in the collection."

The history of the calculus referred to by Professor Owen, as described under H 13 in the published catalogue, runs as follows:— "One large and three small calculi, having articulating surfaces. These calculi were taken from the prostate gland, which was converted into a cyst; they consist of the mixed phosphates, with a little urate of ammonia and carbonate of lime, and weigh 575 grains. One of the calculi protruded about one-tenth of an inch into the cavity of the bladder through an ulcerated opening situated anterior to the natural opening of the urethra."

Mr. Thomas Taylor, of London, informs me that the portions of bladder and urethra from which these calculi were taken, are likewise preserved in the Museum, and were presented by Mr. Lawrence.

Desirous of finding mention of some case analogous to the one which had occurred in my practice, I referred to the admirable monograph and prize essay by our respected President, Mr. Crosse, "On the Formation, Constituents, and Extraction of the Urinary Calculus," and particularly to the fifth chapter, relating to urethral and prostatic calculi.

Although in that chapter several remarkable cases are related in which large calculi had been extracted from the prostatic portion of the urethra, reference could not be found to any case in which the calculi presented the same characters as the one I have described. Somewhat similar cases, as far as the situation of the calculus is concerned, are detailed in pages 26, 27, 29, and 30 of that treatise, and the practical and experienced author strongly recommends the removal of the calculus thus placed by a lateral incision in the perinæum, where a staff can be introduced into the

bladder, or by cutting upon the gripe, where it cannot. In the following foot-note of page 27, cases are alluded to particularly bearing upon the mode of treatment adopted in the one just now described.

"In *Essays and Observations, Physical and Literary,* vol. iii., p. 546, published by the Philosophical Society of Edinburgh, Dr. Livingston has related two cases of vesico-urethral calculus; in one the calculus was found *post-mortem,* in the other he operated by cutting on the gripe. The difficulties attending such an operation, where you propose to operate and cannot get a staff into the bladder, are shown in *Medical Facts,* vol. viii., p. 126; also in an interesting case by Mr. Chcston, of Gloucester, related in the *Medical Records and Researches,* vol. i., p. 163. Under complete retention of urine, with a stone thus lodged, or a small stone impacted in the commencement of the urethra, the surgeon, being unable to get either catheter or staff into the bladder, may be compelled to cut into the urethra at its membranous part, and to incise the neck of the bladder, in order to give outlet to the urine, and at the same time to remove the calculus. I have met with examples of such practice being required.

"M. Deschamp removed a calculus, situated in the prostatic urethra and causing complete retention, by an incision, as in the lateral operation of cystotomy. (*Traité de la Taille,* tom iv.) Sabatier, (*Méd. Opératoire,* tom iii., p. 136,) observes that the Celsian method is preferable to all others when the stone, having lodged at the neck of the bladder, has gone on increasing so as to extend into the urethra and become prominent in the perinæum; and Dionis, (*Operations de Chirurgie,* par La Faye, p. 221,) previously made the very same remark."

This being an unusual case, not only from the fact of so large a calculus lodged and increasing in the prostatic urethra having been removed by operation, but from the mechanical structure and chemical nature of the calculus itself, I wrote to Mr. Crosse concerning it, and forwarded the calculi for his examination. To that gentleman and his son I am indebted for having put together the several pieces, so as to build up the calculus as it existed in the urethra, and from which a few casts have been prepared by Mr. Charles Goodwin, of Norwich.*

* Possessed of the mould I shall be happy to prepare a cast for any gentleman who may wish to have one.

Drawn & Lith.d by B. Rudge Bedford

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The entire stone is four inches and seven-eighths in length, and considerably larger at one end than at the other. The *larger* extremity had been situated posteriorly in the prostatic part of the urethra. Around the broadest part it measures four inches and five-eighths, from which it tapers to the other extremity, where it measures one inch and five-eighths in circumference. Midway between the two ends it measures three inches and a half. It is rounded and convex on the lower surface, or that which was nearest to the perinæum, which is the aspect respresented in the plate; and the opposite surface is somewhat flattened and concave. It presents two curves,—a larger one, the concavity of which is in the centre of the upper surface of the stone, and apparently corresponding with the curved shape of the posterior part of the urethra, and a smaller one in the opposite direction, near the anterior extremity. The surface is intersected with numerous angular lines, indicating the division of the stone into many pieces, which are well shown in the plate.

In order to give some idea of the difficulty in fitting together the several pieces constituting this calculus, I cannot do better than transcribe part of a note from Mr. Crosse, dated April 7, 1844.

"You will be surprised to learn that my son put together nineteen portions of the calculus sent me, and that by two hours attention last night I adjusted the other eight, so that I have made out a most singular specimen, shaped like the outline herewith sent, nearly five inches long. There is one vacancy which answers to the large portion you sent to Dr. Golding Bird, and the anterior flat end shows a deficiency, which I can readily supply in imagination, as shown by the dotted line, and to which the fragments you name undoubtedly answer. The portions are now fixed together lightly by gum; and I hope to be able to make a cast, and then I will write to you more fully. This is the most curious and intricate puzzle I ever saw. The Chinese puzzle is nothing compared to it; and how my son advanced so far in adjusting the pieces is singular, without which step being gained I should not myself have entertained the slightest idea of accomplishing the difficulty."

In another note the same gentleman observes that "a relapse is almost sure to happen in all cases of a large calculus removed from

the prostatic urethra, because the urethra remains large and out of shape, leading to deposit from the urine lodging there; and also because the lining membrane of such cavity furnishes a mucous secretion which much disposes to deposit of fusible calculus."

The man, whom I examined a short time ago, apparently continues free from further calculous deposit, although he is unable to retain a larger quantity of urine than before specified.

I have purposely refrained from treating of the bibliography and literature of the subject of similar prostatic calculi, and from a discussion of the manner of their formation, whether in the urethra by deposit from the urine, as is the opinion of Mr. Crosse, or in the cells of the prostate gland, as plausibly conjectured by Dr. Golding Bird, and have restricted myself to a concise description of the case and its treatment, merely giving some elucidatory parts of the correspondence which has resulted from it.

An expression of obligation is due to Mr. Bradford Rudge, of Bedford, for so ably executing the accompanying drawing.

AN ESSAY,

LITERARY AND PRACTICAL,

ON

INVERSIO UTERI.

PART II.

BY JOHN GREEN CROSSE,

Senior Surgeon to the Norfolk and Norwich Hospital, &c.

In resuming my pen to pursue, in systematic order, the subject to which I am pledged, I cannot reconcile myself to offer any apology to the reader for deferring an account of *the treatment* of so serious and fatal a malady, until a full history of all other branches relating to it has been submitted. It would be safer, indeed, to infer the treatment, from an attentive perusal of the history, causes, symptoms and nature of the disease, than to dwell only on the first of these—the treatment—and neglect all the rest. Sound principles of treatment can only be arrived at through a knowledge of the malady requiring our aid.

It would be difficult to fix upon any disease of rare occurrence, which affords so much recorded evidence to interest and instruct the attentive inquirer, as inversion of the womb; and, no wonder, since there is in the human frame no other organ naturally subject to the same great physiological changes, the same variations of size and functions, of temporary developement and subsequent quiescence. A very renowned writer called the uterus the *miraculum naturæ;*[1] but such views of the importance of this organ,

[1] J. Swammerdam, *de Uteri Muliebris Fabrica*, Lugd. Bat., 1672.

in a physiological and pathological sense, ill accord with the prejudices fostered in this country, even in the very highest quarters, against obstetrical practice,—prejudices tending, it is to be feared, not less to the injury of the public than to the unjust discouragement of those who pursue that most arduous and responsible branch of their profession.

SECTION VII.

ON THE INFREQUENCY OF INVERSION OF THE WOMB.

The frequency or rarity of any particular disease can only be satisfactorily established upon the evidence of statistical returns; and in so far as these have been hitherto obtained upon inversion of the womb, they indicate that it is of very rare occurrence. Amongst 850 cases selected by Mauriceau[2] from his extensive obstetrical practice, as being worthy of publication, only six examples of this displacement are referred to; and La Motte[3] gives but one example amongst 652 published cases of midwifery. Dr. Collins,[4] in his account of 16,654 cases of delivery at the Dublin Lying-in Hospital, met with no instance of the womb being inverted; and Dr. M'Clintock,[5] referring to the same establisment, represents that amongst upwards of *seventy-one thousand* women delivered there, not a single instance of uterine inversion is known to have occurred! In great public institutions of this kind we may expect, from the absence of all injudicious hastening of the parturient process, and the correct treatment adopted, that an accident so generally resulting from mismanagement should be very rare, yet I have myself known a case of uterine inversion, occurring in a midwifery institution, under the superintendence of a student, and proving fatal before experienced aid could be summoned to the spot; and however infrequently such cases occur in the public hospitals of Dublin, they are not so very rare out

[2] *Traité des Maladies des Femmes*, i, 392, 3; ii, 186, 294, 558.

[3] *Traité des Accouchemens*, pp. 653, 655.

[4] *Treatise on Midwifery occurring at the Dublin Lying-in Hospital, during Seven Years.* 1835.

[5] *Dublin Journal of Medical and Chemical Science*, xvii, 54.

of those institutions, many instances of the disease in its chronic stage having of late years been detected in that city, as will be hereafter noticed. The very circumstance of believing a disease to be of rare occurrence is calculated to lead to oversight. A. Petit never detected a case of uterine inversion himself, and became so sceptical as to question if it ever occurred. Boerus,[6] in many thousands of obstetrical patients, never met with, nor even heard of a case of the displacement, and at length published his doubts on that subject; but did not this same author[7] afterwards mistake an inverted uterus in the chronic stage for a polypus, and attempt its removal with a fatal result? It is easy to conceive that the careless and routine practitioner may go on during a long life without ever detecting a case of the kind, unless the organ be externally prolapsed *post partum* as well as inverted.

Were we to admit the great rarity of uterine inversion, (and it ought certainly to be very rare,) still the imminent danger attending it, and the errors committed in its diagnosis when really met with, may be pleaded as sufficient excuse for calling attention to the subject; for[8] "hoc vitium non ea propter, quod sæpius eveniat, sed quod semper fere mulieris vitam in præceps dat, medici attentionem quam maximam excitare oportet." It would be altogether wrong, indeed, to regard this displacement as deserving less consideration on account of its rarity; the contrary would be a safer rule. The gravity of the case, its sudden invasion, the pressing urgency for immediate relief, before the accoucheur can in general bring to the spot further assistance, all concur to prove how requisite it is that he should keep in mind the possibility of this sad occurrence, and be prepared to form in an instant the correct diagnosis, and to conduct the treatment on the emergency.

It is to uterine inversion consequent on delivery, that the preceeding observations particularly apply, on account of its being the most frequent. Of just *four hundred* cases which I have noted, from different sources, since I began to investigate the subject for

[6] "Ego inter tam multa partuum millia, et in urbe hominibus refertissimâ, nunquam vidi nec audivi quidpiam." *Naturalis Medicinæ Obstetriciæ Libri septem*, p. 590; A.D. 1812.

[7] "Hield Boer in Wien einen umgekehrten Uterus für einen Polypen, unterband ihn und die Kranke musste ihren Geist aufgeben."—*Hauck, in Casper's Wochenschrift für die gesammte Heilkunde*, iii, 683; A.D. 1834.

[8] *Weber's Diss. de Uteri Inversione*, p. 9.

a public purpose, I find that (quoting even numbers,) *three hundred and fifty* occurred as a sequel to parturition, *forty* from polypus, and *ten* only from all other causes, such as are enumerated in section 6 of the first part of this Essay; and whilst many authors publish only a single case during their long experience, as Daventer,[9] Smellie,[10] and Chapman,[11] others afford us the result of much greater experience, particularly those whose attention happened to be awakened to the subject. Ruysch, who not only wrote but lectured most emphatically on uterine inversion, and believed that he thereby prevented its occurrence through the instruction thus conveyed to midwives as well as accoucheurs, was called to two cases in the same day.[12] Velpeau[13] has referred to six examples of the displacement in the chronic stage, being but a part of his experience; Dr. Ramsbottom[14] gives the same number; Dr. James Wilson, of Glasgow, has communicated to me four cases, occurring in his own practice in a few years; Martin-le-Jeune[15] and Windsor[16] give reference to six cases; and Denman,[17] Ingleby,[18] and Newnham,[19] each met with a greater number. From Meissner[20] we learn that three cases occurred in his practice in two years; whilst Dewees[21] relates no fewer than *eight* cases, and Dr. Radford,[22] in his excellent memoir, *ten;* A. E. von Siebold[23] mentions having

[9] *Art of Midwifery*, third edition, p. 140.

[10] *Cases and Observations on Midwifery*, second edition, iii, 445.

[11] *Treatise on the Improvement of Midwifery*, second edition, p. 123.

[12] "Quis putaret, fieri potuisse, antequam institutiones has occeperam, ut unâ die vocatus fuerim ad duas mulieres, de quabus asserebant, quod monstrum illis ex corpore penderet, postquam enixæ erant fœtus, et sitas secundinas? Quid referi? O facinus infandum! ipse uterus per vaginam eductus, ex vulva pendebat inversus." (*Adversarior. Anatomic. decas secunda*, p. 37.) In a work published twenty years before, Ruysch said, "Memini me bis unâ in septimanâ hoc vidisse." (*Obs. Anat. Chir.*, p. 16.) The long interval may suffice to explain this discrepancy.

[13] *Gazette des Hôpitaux*, vi, 413.

[14] *Principles of Obstetric Medicine and Surgery*, p. 450.

[15] *Mémoires de Médicine et de Chirurgie Pratiques*, p. 185.

[16] *Medico-Chirurgical Transactions*, x, 385.

[17] *Practice of Midwifery*, fifth edition, p. 538.

[18] *Facts and Cases in Obstetric Medicine*, p. 225.

[19] *Essay on Inversio Uteri.*

[20] *Die Dislocationen der Gebärmutter*, Th. 3, s. 25, 29.

[21] *System of Midwifery*, eighth edition, p. 447.

[22] *Essays on various Subjects connected with Midwifery, on Inversion of the Uterus*, p. 3. Also *Dublin Medical Journal*, for September, 1836.

[23] *Handbuch der Frauenzimmerkrankheiten*, ii., 375.

treated *eight* cases successfully, after a particular method, and refers to many examples he had met with of this displacement in all its different stages; Saxtorph[24] has *five* cases. I have reason to believe that Dr. Hamilton, the late Professor of Midwifery in the University of Edinburgh, had, in the course of his long life, been called to many more than a *dozen* patients suffering from uterine inversion after parturition; and Baudelocque could not have seen and discriminated fewer than *twenty*. Millot[25] says that no instance of inversion of the womb had been known to occur in Paris for a long period; but in 1773, three females were discovered to suffer in this way in four or five months. Many more have been met with of late, or how could so many instances of operations for the removal of the chronically inverted uterus be recorded as we have observed in the recent French journals?

In the circle of my immediate medical acquaintance I find many who have seen each a case or two; and since I have directed their attention to the subject of inversion, several have detected slighter degrees of the displacement to be present, accounting for unfavourable symptoms just as the delivery was completed. Again, I may remark that many writers, of the highest authority, do not regard inversion of the womb after parturition as so very infrequent; and perhaps this is attributable to their viewing it more comprehensively than others, and in all its bearings, tracing the malady from the slightest degree of depression, under an irregular contraction of the organ, through all its successive stages, to total inversion with prolapse. Denman,[26] who has already been deservedly commended for his ready avowal of every oversight, to turn it to public good, has acquainted us that, being called in consultation to a patient in great danger just after delivery, he very imprudently neglected "to examine *per vaginam*, so that the inversion was not discovered until twenty-four hours had elapsed; attempts at reduction were then made, but failed, and the patient died several months afterwards, exhausted by hæmorrhage." Such an event was calculated to make a strong impression upon his conscientious mind; and in maturer years, on giving his experience to the profession,

[24] *Acta Societatis Medicæ Havniensis*, iii., 402-9. Also, *Saxtorph's Gesammelte Schriften*, von D. P. Scheel, s. 306-8-12.

[25] *Supplement à tous les Traités sur l'art des Accouchemens*, ii., 259.

[26] *Practice of Midwifery*, fifth edition; description of plate 12.

he inquired, when hæmorrhage proves fatal, after the placenta is away,[27] "May it not be suspected that in such cases there was an inversion of the uterus, partial or general, which, together with hæmorrhage, is always attended with dreadful disturbance of the whole nervous system?" And so great was his suspicion of inversion being frequent, that he advised the accoucheur, in every case of hæmorrhage after delivery, to introduce the hand into the uterus, in order to ascertain the fact! Let this be done, and the occurrence of inversion will probably be deemed less infrequent, but its treatment will be improved, and the consequent mortality greatly diminished.

If the reader desire more to arouse his attention and steady his judgment, I would suggest the perusal of Levret's[28] remarks. I feel strong reasons for believing, as has been repeatedly stated by authors of high reputation and great experience,[29] besides those already quoted, that partial inversion exists more often than is generally suspected, and is the cause of hæmorrhage after delivery of the after-birth. Mr. Windsor[30] has made successful allusion to the reasons for entertaining the same belief, observing, that "as the accident is generally thought to imply a degree either of carelessness or rashness on the part of the accoucheur, in the extraction of the placenta, he will endeavour, with a view to save his own credit, to keep the real nature of the affection as secret as possible; and an early death often assists in throwing the shade of oblivion over the patients themselves." In support of these sentiments it will be an easy, but I hope it will not be considered an invidious task, to refer to instances placed on literary record, where oversight through ignorance, or concealment designedly practised, has contributed towards a wrong estimate of the frequency of uterine inversion; and to a brief notice of such records I shall snbjoin

[27] *Practice of Midwifery*, fifth edition; description of plate 12, p. 541.

[28] Admitting that uterine inversion is rare, this author adds:—"Nous ne sommes cependant pas dispensés de la connaître; loin de là; c'est un appas pour la curiosité, ou pour mieux dire, un motif de plus pour exciter notre émulation et nos recherches, afin de ne nous pas méprendre dans l'occasion." (*Obs. sur la Cure de plusieurs Polypes de la Matrice*, seconde edition, p. 125.)

[29] See *Le Roux, sur les Pertes*, Art. 4, *Renversement de la Matrice, cause de perte de sang*. Also, *Deleurye, des Accouchemens*, p. 442, as already quoted in note 31 of Part the First.

[30] *Medico-Chirurgical Transactions*, x., 359.

some original and hitherto undivulged examples, bearing upon the same point.

In several instances where hæmorrhage has proved fatal after delivery, it has been ascertained on autopsy, although not previously suspected, that *depressio* existed, and was the undoubted cause of death.[31] The next degrees of displacement, even total inversion, have passed equally unnoticed and unknown, until a *post-mortem* inspection;[32] and even when total inversion, with external prolapse of the tumour, has taken place, it has passed unobserved, or been concealed by the only person who had access to the unfortunate patient, and ultimately been brought to light under an order for disinterment, to support a criminal charge.[33] No other case has, in relation to the infrequency of its occurrence, been so often brought into a court of justice as *inversio uteri*.

Looking to this disease as discovered in the chronic stage, we find histories that must influence our estimate of its frequency, or at least show the difficulty of arriving at a correct calculation. When the first and dangerous stage is successfully passed, it is very usual for the malady not to be discovered until several months have elapsed;[34] and numerous are the examples of from one to even ten or more years[35] having intervened between the first occurrence

[31] The most noted case is by Mauriceau; the woman died suddenly, half an hour after a favourable delivery, being unexpectedly seized with convulsions induced by profuse flooding. On autopsy the uterine fundus was found indented, "comme le cul d'une phiole de verre." (*Obs. sur la Grossesse, &c.*, ii., 186.) Fries states that his father, on examining the body of a female who died suddenly after delivery, found the fundus uteri depressed. (*Abhandlung von der Umkehrung der Gebärmutter*, s. 59.)

[32] See Horteloup's case, in note 61, of Part the First.

[33] See Canolle's case, referred to in note 43, of Part the First.

[34] In a great proportion of chronic cases the inversion has not been discovered for several months. Dailliez has a case first detected at six months, (*Thèse*, p. 114;) Mauriceau, at eight months, (*Des Accouchemens*, ii., 294.) The most frequent latent period is nine months, of which two examples have already been noted, from the late Dr. Ingleby's experience, in Part the First of this Essay, (see descriptions of outline fig. 6 of section 3, and of plate 7,) and others might easily be added.

[35] A case overlooked by the surgeon consulted one year after delivery; was first found out by Mr. Gregson, six months afterwards. (*London Medical Gazette*, xxxvii., 342.) See for fourteen months interval, Dr. Charles Johnson, (*Dublin Hospital Reports*, iii., 481;) for eighteen months, Lasserre, (*Encyclographie des Sc. Méd.*, xxxvi., and *Journal des Sc. Méd. Chir., Juillet*, 1835;) for twenty-two months, the Paris case, (*in description of plate* 5 *in Part the First of Essay*;) for two years and a half, Dr. Symonds, (*London Med. Gazette*, vii., 242.) Then Placido Portal's case, though previously in a public hospital more than once on account of the uterine

of the malady and its detection by a competent surgeon. The unavoidable inference is, that many die during this latent period without the disease having been discovered at all during life; the examples which may be quoted of chronic inversion being found on dissection *post mortem*,[36] tend to prove the correctness of that inference.

Reverting to the disease when it happens *post partum*, I may observe how often has the ignorant midwife returned the prolapsed organ into the vagina still inverted,[37] or designedly, finding something wrong,[38] taken this way of concealing it!—nor is the medical

disease, was only detected after four years' continuance. (*Bulletino delle Scienze Med. di Bologna*, xi., 123.) Six years of oversight transpired in Moss's case, (*The Lancet*, xxx., 350,) and the same period in Dr. Charles Johnson's second case. (*Dublin Hospital Reports*, iii., 483.) Dr King's patient suffered ten years before the nature of her malady was known, and lived as long afterwards. (*Glasgow Med. Journal*, i., 173.) In several of these instances the inverted organ prolapsing outwardly led to the discovery.

[36] "J'ai vu des exemples du renversement de la matrice dans les cadavres des femmes mortes en couches, dont deux ont servi à mes démonstrations. La matrice formait au dessous des parties extérieures de la generation une tumeur ayant la figure d'une poire un peu aplatie en avant et en arrière, d'une couleur brune très obscure." (Portal, *Anatomie Médicale*, v., 537.) Of the two cases stated to have been found by Professor Mackenzie, (see Dr. King, in the *Glasgow Medical Journal*, i., 173,) and referred to by myself in Part the First, in figs. 8 and 9, one was really uterine inversion, and is represented more particularly in plate 9; of the other I have to give a corrected account in a subsequent page, (Section XI.) See Dr. Houston's cases in explanation of plates 6 and 8 of Part the First of Essay. In a woman, aged seventy years, who died of pneumonia, Lisfranc found the uterus inverted; it must, therefore, have existed twenty-five, or thirty years, supposing it consequent on parturition. (*Clinique Chir.* iii., 381.) Another case, discovered only by *post-mortem*, and of above five years duration, is related by the same author. (*Ibid.*, p. 283.) Bang is stated to have found the uterus inverted on autopsy, as noted by Fries, (*Abhandlung, &c.*, s. 33;) and Meissner, (*Dislocationen &c., Th.* 3, s. 79.) Both authors quote from *Acta Reg. Soc. Havniensis* iii., A.D. 1792; but one states that the patient had lived nine months, the other (Meissner,) a year and three quarters, after her last delivery, and I am unable to clear away this confusion.

[37] A woman died from *inversio uteri*, which the midwife took no means to correct. (*Bredenoll, in E. von Siebold's Journal für Gebürtshülfe*, iv., 76.) The midwife, "*faute de savoir*," pushed back the uterus into the vagina, still inverted. (Dailliez, *Thèse*, p. 81.) The inversion being in the vagina, the midwife allowed the accident to pass *sub silentio*. (King, *Glasgow Med. Journal*, i., 173.)

[38] Instances of this sort are so numerous, that it seems to be unnecessary to specify any, save to observe Mauriceau's history, where "the midwife put the prolapsed organ back into the vagina without reverting it; the patient suffered from hæmorrhage for eight months before the malady was discovered." (*Mal. des Femmes*, ii., 294.)

man free from the charge of having adopted the same unfortunate proceedings,[39] oftener for purposes of concealment than from ignorance of what he was doing.

There is still to be noticed another source of difficulty in the way of a correct knowledge of the frequency of uterine inversion. A consultant is called to aid the ordinary attendant in his distress, and, in tenderness to the reputation of a professional brother, suppresses the cause of the fatal result. A very intimate and early friend of mine, now the experienced surgeon of a large county infirmary, was summoned to aid a young practitioner. Arriving after the death of the patient, he found the inverted uterus depending between the limbs half way towards the knees, with the placenta still adhering, which he detached, and immediately replaced the uterus within the body, and "no one ever knew to this day," writes my informant, "but the accoucheur and myself what had happened!" Sir Charles Mansfield Clarke, my former and respected preceptor, has narrated to me in conversation, with still more spirit and effect than he used to give it in his lectures,[40] the following case:—He was urgently summoned, and met the practitioner coming from the patient's house, who told him *all was over*. Enough was soon elicited to convince Sir Charles that death had ensued from a prolapsed and inverted womb; so he went to the house, reduced the organ into the abdomen, first contriving that all female attendants should be absent, and kept the secret. The lecturer used to conclude by saying, "I never look back on that case without knowing that I saved the reputation of a medical man." Whilst we may respect, in a certain degree, the motives which prevail on these occasions, it must be admitted that, if such concealment is to be practised, not only towards the public but towards members of our profession, it will tend to make uterine inversion apparently more rare than it really is. The recent improvements in respect to the registration of deaths in this country, requiring causes to be assigned, will effect something

[39] The prolapsed uterus (still inverted,) was pushed back into the vagina, the doctor supposing no more was required to be done. (Channing, in *New England Med. and Surg. Journal*, xi., 264.) Dr. Ramsbottom, called in after the death of the patient, found the inverted uterus filling the vagina, the attendant having contented himself with thus concealing the organ from sight. (*Obstet. Med. and Surgery*, p. 541.)

[40] Private copy of his *Lectures on Midwifery*, in MSS., taken by myself.

towards the obtaining of a more correct account of the cause of death, when it results from the displacement in question.

It is quite horrifying to read the numerous instances on record in which the inverted womb has been mistaken by the midwife, and been pulled at,[41] mutilated,[42] torn away,[43] or cut off with knife, razor, scissors,[44] generally, but not invariably, with a fatal result.

[41] Cases of this sort are too numerous to be specified. The quaintest account is related by Peu, (*Pratique des Accouchemens*, p. 605,) who appeased the enraged populace, and saved the midwife from being thrown out of the window. Although death happened before he reached the patient, Peu detached the after-birth, and returned the prolapsed and inverted organ to its proper situation.

[42] The uterus being inverted in extracting the placenta after an easy labour, the midwife, urged on by the people around her, did her best to bring all away. "Advocatus D. Mothius, sine voce, nutu et pulsu puerperam invenit, mortuamque pronunciat; occupata deinde obstetricis sede, immissaque sub lecti stragulis manu, ipsum uterum integrum marsupii propendentem et *ab utroque latere perforatum obstetricis digito*, deprehendit, adstantibusque monstravit, vere tum mortuam serò credentibus." (*Th. Bartholin in à Meek'ren Obs. Med. Chir*, p. 336.) The midwife cut into the presenting fundus uteri with scissors. (*Herder, Diagn. Pract. Beiträge*, s. 119.)

[43] Une matrice arrachée par une sage-femme, blessée, et necessairement extirpée avec succès." (*Sue le jeune, Essais historiques, littéraires et critiques sur l'art des Accouchemens*, ii., 447.) "Obstetrix cum post partum secundinam attrahere vellet, et ipsius loco uterum arripuisset, extraxissetque, tandem quoque abscidisset, eadem die puerperam naturæ satisfecise." (*Hildani Opera*, p. 904.) The midwife tore off the inverted uterus, mistaking it for a mole, and the patient instantly expired. (Baxter, in *Medical and Physical Journal*, xxv., 213.) A similar case, the complete separation effected by the knife, after the organ had been nearly torn off, mistaken for a second child; the patient recovered. (*Braithwaite's Retrospect*, vi., 251, from *Edinburgh Med. and Surg. Journal.*) The midwife tore away part of the uterus with the placenta, mistaking it "pro fœtu peculiari vel gemello;" death in an hour. The surgeon who conducted the autopsy found the rest of the uterus depending at the labia, "ex sinu muliebri ultra spithamam propendens in cadaveris dissectione cum stupore adstantium cernebatur!" (*H. von Sanden, Obs. de Prolapsu Uteri inversi*, p. 24, from Bohnius, in *Actis Facultatis Medicæ Lipsiensis.*) The prolapsed inversion being taken for a mole, the *sage-femme* persisted in tearing it away; and although a surgeon arrived, she would not desist till the interesting victim of her ignorance had breathed her last. (Dailliez, *Thèse*, p. 54.)

[44] The case related by Wrisberg, and fully noticed in Journals of the day, (see *London Med. Rev.* and *Mag.* for 1801, v. 295,) is amongst the most extraordinary on record. The midwife had inverted the uterus of a primiparous patient, and brought it external to the labia. Her next proceeding was to cut off the organ with a knife and bury it with the placenta. For two days no further advice was obtained, and Wrisberg was only called after three days had elapsed, and found her *in articulo*. He plugged the passage with sponge, to prevent descent of the intestines; and by appropriate means rallied the patient, who completely recovered. The excised organ

These occurrences are, unhappily, not limited to midwives, but have transpired in the hands of accoucheurs or surgeons,[45] some of them possessed of the best information, and regarded as being duly qualified to practise their profession. Besides what has been long placed on record, cases have been communicated to me, upon the best authority, or have occurred under my own observation, which I feel bound to place upon these pages. A very experienced and zealous surgeon of my acquaintance has related to me the following, but with those feelings which are characteristic of a well-disposed mind, wishes no names to be stated, although one of the parties implicated has been long since deceased, and the other lives in retirement, after having conducted for many years an extensive practice. At the close of a complicated labour one surgeon called

was obtained and preserved in spirit, for illustrating the Professor's Lectures, at which the patient used to attend, when her own case was discoursed upon; and the author observes:—"Singularis erat omnino scena, visu admodum jucunda, matrem intueri, matrice sua, in spiritu asservata, coram in mensa collocata, privatam, puellam vivam in sinu fovere et amplecti, quæ in ablato illo uteri ante aliquot menses habitaverat!" (*Wrisberg de Uteri mox post partum Resectione*, &c. p. 19.) This singular preparation was preserved in the Museum at Göttingen, but subsequently removed to Moscow, where I have in vain attempted to obtain an inspection of it, my correspondent informing me that it has disappeared, the Museum in Moscow having recently been divided, and part sent to another city. (See *Loder's Index Præparat. ad Anat. spectant. quæ in Musæo Cæs. Universitatis Mosquensis servantur, Mosquæ*, 1823.) Scarcely less worthy of notice is the case related more recently by Bernhard, where the midwife, under very similar circumstances, cut off the inverted uterus with a razor, close to the *labia externa*. The profuse hæmorrhage was arrested by filling the vagina with ice, and the poor woman, by milk diet, and without any physic (for Nature, as the writer observes, "sometimes works wonders,") recovered, with no remaining inconvenience save incontinence of urine. (*A. E. v. Siebold's Lucina*, i., 401.)

[45] The surgeon pulled at the inverted uterus, not knowing what it was, and death ensued in a few days from inflammation. (*Mauriceau, des Accouchemens*, i. 393.) The inverted fundus, having passed the os uteri, was mistaken for the head of a fœtus, and torn away with the forceps. The woman was living two years afterwards, afflicted with incontinence of urine. (Figuet, in *Richter's Chir. Bibl.* iii., 121; from *Roux's Journal de Méd. Chir. et Pharm.* xli., A.D. 1774.) A surgeon, having inverted the organ, cut it off, the patient expiring speedily. (Ingleby, *Facts and Cases in Midwifery*, p. 229.) A *quasi doctor* tore away the inverted uterus, saying it was "a polypus or a false conception," and that he never had met with such an extraordinary case before: death almost immediately followed. An inquest was held, and the offender mulcted with a heavy fine. (Griscom, in *New York Journal of Medicine and Surgery*, and *American Journal of Medical Sciences*, xxiv., 518.) "Un chirurgien, en accouchant une dame, emporta la matrice, et la faisait voir comme une pièce curieuse, bien éloigné de penser que ce fût effectivement elle!" Dailliez, *Thèse*, p. 103.

the other to his assistance, and, with the consent of the latter, cut off with a knife a large mass that prolapsed, which was shown to my informant, who satisfied himself that it was the inverted uterus: the bowels protuded, and were with great difficulty put back and retained within the abdomen. The woman died immediately, and the real cause of this fatal result was never divulged until the present time, nearly thirty years since the occurrence.

The following still more remarkable and touching case has never before been made public, and only once been briefly alluded to, on a recent occasion,[46] by the talented gentleman through whose aid I have become possessed of full particulars.

A woman, aged twenty-two years, had the attendance of a medical practitioner, legally qualified, so far as being licentiate of the Apothecaries' Company; it was her first labour, and when it had arrived at an advanced stage this attendant, being required elsewhere, left the patient in the care of a midwife, and on his return found that the child had been born some time and the placenta removed, but that something protruded at the labia, which he hastily pronounced, on examination, to be a polypus. It is stated that, up to this period, the hæmorrhage had not been profuse. The medical man proceeded forthwith to cut away this supposed polypus with scissors; there was instantly a tremendous hæmorrhage, and the poor woman expired in about half an hour from the commencement of the operation. A surgeon had been sent for, who arrived very soon after the patient's death, and on learning the history, and observing the quantity of blood lost, remarked "that the operator might as well have cut off her head," and left without using any less ambiguous expressions. The corpse was interred after a few days, and all might have passed off quietly; but the unfortunate operator finding that he suffered from the ambiguous remark of the surgeon, threatened the latter with a prosecution for defamation. At length things went so far that the surgeon felt it necessary, in self-defence, to demand an inquest, which, after many obstacles had been contended with, was finally granted. The body was consequently exhumed. After persevering search the excised tumour was discovered in the privy, and on being washed was found so little decomposed, that it was pronounced to be about two-thirds of the inverted womb. This

[46] See T. Herbert Barker on "Inversion of the Uterus," in *London Medical Gazette*, xxxiv., 10, 43.

being certified by eight or nine surgeons, some amongst them of the highest respectability and station, was deemed by the coroner and jury sufficient, and the corpse was not examined, although undoubtedly it ought to have been. When the removed organ was produced in court the unfortunate operator, with the deepest emotion, and amidst profound silence, made an appeal to the jury, acknowledging that what he had done was from ignorance of the case. The verdict recorded was, "That the woman died from the ignorance of the medical man." The case went no further, save the injury it inflicted on the character of the unfortunate practitioner, who, nevertheless, continued to practise midwifery on the same spot, and attended the poor of the parish union[47] for many years afterwards, until the period of his decease.

Having been carefully studying the subject of *inversio uteri* for a year or two, and my mind being fully impressed with the many disastrous events connected with it, I became concerned in instituting an inquiry into the following case, in which even more was elucidated than my suspicions, though strong, had prepared me to expect.

Jane Lovett had borne eight children, and the same midwife had been present at every birth, but on the two last occasions there had been delay in the removal of the placenta, on account of which a surgeon had been called and effected a complete delivery with safety to the patient. On one of those occasions there was hour-glass contraction, the placenta lodging in the upper division of the uterine cavity; on the other the placenta was also retained and found adherent to the fundus, but was readily removed by the introduction of the hand to separate the adhering surfaces. This woman was in her thirty-sixth year when her ninth accouchement was expected. The usual midwife, recollecting the former difficulties from sticking of the after-birth, as she expressed it, declined to attend, unless at the same time a medical man were sent for. Accordingly Mr. Raymond Gaches, a licentiate of the Apothecaries' Company, residing in the village, was engaged to attend when required. Jane Lovett was taken in labour on Sunday, the 19th of January, 1845; and an hour or two after the arrival of Raymond Gaches, a healthy living child was born. The placenta not

[47] On the same spot, the parish midwife mistook the inverted uterus for some part of a second fœtus, and tore it away completely, with an immediately fatal result.

following, this medical attendant proceeded to remove it; he soon broke the funis, and subsequently removed portions of the placenta, and continuing his operations, causing most excruciating sufferings to the patient, he at length, and by great perseverance, removed a large mass, which the women present thought looked like a liver, or an enormous after-birth. This mass Raymond Gaches took away in the chamber vessel to his own house, situated near by, and soon returned, but before he arrived the patient was dead. The next day Gaches represented that he had removed a large tumour, or polypus, weighing above three pounds. This tumour he showed to several persons in the village, but not to any medical man, although he had stated, to quiet the distracted mother of the patient, that the case was so curious and extraordinary (as in truth it was,) he should bring it to me, to be placed in my pathological museum; after a few days the tumour disappeared, and was never afterwards forthcoming.

I heard nothing of these occurrences until nearly five weeks had elapsed since the patient's decease, and their effect on my mind was to induce strong suspicions as to what had happened; and from the rumours afloat, and the representations which were made to the coroner as to the propriety of an inquest, a jury was impannelled and the body disinterred on the 28th of February, being just *forty* days after death and thirty-six after burial. The weather being severe and frosty the body was not much decomposed; and in the presence of nearly a dozen medical gentlemen, all resident in Norwich, the autopsy was performed, exhibiting the following astounding facts.

The abdomen, viewed exteriorly, presented a marked convexity in the umbilical region, and on the abdominal parietes being divided, it was found that gas occupied the highest part of the peritoneal cavity answering to that convexity, the remaining viscera only filling the lowest part towards the spine. The stomach was situated scarcely lower than naturally, being above the level of the umbilicus, with its large curvature turned downwards and a little forwards, from which only torn shreds of the great omentum proceeded. Including the duodenum, the whole of what remained of the small intestines, traced from the stomach downwards, measured *sixteen feet three inches,* terminating below by a jagged, torn, and open extremity. The urinary bladder was *in situ,* and

contained about three ounces of urine. Behind the bladder, and chiefly occupying the pelvic cavity, was the rectum, which, traced from the anus, extended only *thirteen inches*, and terminated at the sigmoid flexure of the colon by an open end, jagged at its edges, as if partly torn and partly cut across in that situation. What remained of the vagina was about four inches in extent, reckoning from the external labia, and its superior limit or termination was a torn jagged edge several inches in circumference, and in some parts rather indicating that it had been cut and not torn. All the solid viscera were normal, and there were no signs of any preternatural adhesion of any of the viscera to each other. Some clots of grumous blood were in the lower part, towards the pelvis; there were no loose fæces. Thus it became demonstrated that *all the uterus* with its appendages, all the large intestines, except the lowest thirteen inches, nearly all the great omentum, the caput coli, and two or three feet of the ileum next above it, had been forcibly removed, per vaginam, in this *almost* unparallelled case. How any delusion that had fastened on the mind of the operator could have continued to the completion of this catastrophe is most remarkable, but it probably happened after the following way:— The placenta being attached, perhaps morbidly, to the fundus uteri, and not separating, but the funis being torn through, the practitioner brought away portions of the placenta and pulled down the fundus of the uterus inverted, which he mistook for a huge polypus with an ample base, and considered it was his duty to remove; as the inversion increased, he would think he was accomplishing his object, and having induced total inversion with prolapse, and being thus encouraged with the prospect of soon effecting the complete removal of the tumour, he persevered until he tore away the entire uterus from the inverted vagina. Then followed the intestines, and one cannot conceive it possible that, arrived at this fearful stage of the process, he could fail to discover the dilemma in which he was placed, and the fatal consequences that must ensue; still he continued to pull away the bowels until several yards were removed, and finished by cutting through what he found it inconvenient to tear through, and replacing any portions within the abdomen that were still prolapsing, turned the whole of his thoughts to the means of concealing within his own breast what had happened. The result of the inquest was a

verdict of manslaughter.[48] The unhappy prisoner was tried at the recent assizes held in Norwich, and acquitted under the direction of a merciful judge, and from the evidence on the side of the prosecution being imperfectly developed;[49] so he returned to the village which had been the seat of his fatal mal-praxis, where he still resides, pursuing his former avocation for a livelihood.

For having treated so fully on these tragical histories I may have risked the opprobrium of some, but I shield myself with the consciousness of doing it, not from the desire of punishment of any offending individual, but to aid in obtaining future greater security to the public,[50] and to give a caution against the unfeeling and barbarous practice of midwifery, of which so many examples have lately become known in this country through proceedings in courts of justice. It will surely not be denied that evidence enough has been adduced, from the records of concealed or mistaken cases, inspections *post mortem*, inquests, and the facts substantiated by correspondence or by my own observation, to prove that, although rare, inversion of the womb occurs oftener than it is

[48] A full account of both inquest and trial at assize was given of this tragical case in the weekly periodicals of the day for February and April, 1845 (See particularly the *Provincial Medical and Surgical Journal*, p. 168; also comments in the *London Medical Gazette*, August 29, p. 779; the *Medical Times*, p. 475.) Gaches' case is not unequalled; one very similar to it occurred in London, in 1807; and a full account of it was given in *A Letter on the Practice of Midwifery*, &c., by John Boys, M.D., in the following year. The medical man was tried for *murder*, and very properly acquitted. (See *Ramsbottom's Obstetric Medicine and Surgery*, Appendix G., p. 654, containing a full account of the occurrence.)

[49] Since the case referred to in the preceding note (48) was tried before Lord Ellenborough, (see "Rex *v.* Williamson," in 3 *Carrington and Payne's Reports*, p. 635,) it has been held that, to convict for manslaughter in such cases, either gross ignorance or criminal neglect must be proved, and the counsel in every instance seeks to establish his point by putting the very words required into the mouth of the medical witness, leaving little for judge or jury to consider. As to inverting the womb and endeavouring, under a wrong idea, to remove it, I could only call it ignorance, seeing how often this has been done. To the next question, "What say you as to the bowels?" my reply was—"That part of the case *explains itself*," expecting to be called upon to state *how*, and to show that the whole court as well as the jury would know that to be gross ignorance; but the evidence for the conviction was pushed no further, and the prisoner became entitled to *an acquittal*, there being no charge of criminal neglect.

[50] "De pareils faits doivent être connus; on doit les publier, non pour qu'on imite les auteurs, non pour les couvrir du mépris qu'ils méritent, mais afin qu'on évite de commettre des fautes semblables à leurs."—Dailliez, *Thèse*, p. 100.

suspected, much oftener than it is detected, and taking into account the dangerous nature of the accident, whether detected or not, quite often enough to merit the attention of every obstetrician, and to render it most desirable that every public teacher, within whose province the subject ranges, should make a stirring and powerful appeal to his students, and thereby fix indelibly on their memory and attention the possibility of such an occurrence, that subsequently in practice they may ever keep it in mind, and be ready to prevent, or to detect, and to treat the malady, when present on the fearful emergency. Let not future histories support the remark, so graphically depicted in the retrospect, that this monstrous malady, in spite of all treatises, has been clothed in utter darkness as respects so many obstretricians of every grade,

"Monstrum horrendum, informe—*cui lumen ademptum!*"

for the past history of uterine inversion after parturition, has been little more than a chapter of accidents and oversights, too often compromising, sooner or later, the life of the patient.

SECTION VIII.

ON THE AUTOPSICAL ILLUSTRATIONS OF INVERSION OF THE WOMB.

Amongst the numerous instances on record of fatal cases of uterine inversion, affording information by subsequent examination of the body, many will be found in other parts of this Treatise. A few cases possessing particular interest, and which are not elsewhere brought forward, will be noticed in this section.

Usually the investigator reports only the *displacement*, and gives no further account of pathological appearances. Several authors have observed that the uterus, on examination, was found bloodless,[51] a condition to be accounted for by death having resulted from the hæmorrhage attendant on the inversion, and following quickly the delivery. But cases occur *post partum*, and prove fatal in a few

[51] Even in a majority of dissections of recent inversion, fatal soon after delivery, it has been noted that the parts immediately implicated were bloodless, intimating that hæmorrhage had occurred to a great extent, if it were not the immediate cause of death.

hours or days, where very little blood has been lost. Deleurye[52] narrates a case in point, where only two ounces and a-half of blood had escaped, and adds the particulars of the autopsy performed by himself; death had ensued two hours after delivery, preceded by increasing difficulty of respiration, delirium, and convulsions.

Saxtorph was summoned about thirty hours after delivery of the patient, and found the inversion occupying the vagina; he persevered fruitlessly, and, perhaps, most injuriously, in repeated trials at reduction, until, after eight days had elapsed from the accident, death ensued.[53] "Cadaveris sectione vidimus uterum totum inversum, marsupii duri instar in vagina pendentem, et in concavitate ipsa retracta ligamenta lata, ovaria cum tubis Fallopianis continebantur; circa has partes orificium uteri fortiter adeo constrictum fuit, ut propter stricturam hanc ne in mortuo cadavere quidem sine violentia reponi potuisset fundus propendulus."

The remark of Saxtorph, as to the contracted state of the *os uteri*, and the difficulty of replacing the fundus in the corpse, may probably be ascribed to the degree of irritation and of inflammatory or increased action, that had been induced by manual interference during life. Without questioning the correctness of so high an authority, it may be right to contrast this account with others, where generally it has been observed[54] that the parts which, during

[52] "Totum abdomen flatibus erat valdè distensum; non aderat manifesta regionis hypogastricæ depressio; aperto abdomine, jam non apparebat uterus, quia intestina usquè ad ossa pubis extensa, uterum tegebant. Ipsis remotis, uterus venit in conspectum; in parte hujus superiore reperiebatur foramen, aditum digiti permittens, et uterum inversum designans; ovaria et tubæ Fallopianæ, cum portione ligamentorum ipsis adhærentium, foramen illud ingrediebantur.....Uterum cum dimidiâ parte vaginæ extraxit,—porrò apex fundi uterini inversi orificium uteri ingrediebatur, et duobus digitis transversis superabat. Reductionem seu potiùs explicationem molis extractæ tentavit.....Evolutus uterus figuram sacci exhibebat, cujus aditus *diametrum habebat paulò majorem diametro fundi; vagina vix orificio uteri distinguebatur ob magnum utriusque dilatationem;* partibus lateralibus cavitatis uterinæ plures membranarum portiones subvirides adhærebant. Nullum per totam uteri substantiam neque per totum abdomen inflammationis signum videbatur." (*Theses Anat. Chir. de Utero inverso.*, p. 8.)

[53] *Acta Soc. Med. Havniensis*, iii., 409. Also, *Saxtorph's Gesammelte Schriften*, von Scheel, s. 312.

[54] In numerous instances, the surgeon arriving just as the patient had expired, has reduced the prolapsed inversion. Paul Portal did this after death, where a surgeon, called by the midwife, had failed during life, (*La Pratique des Accouchemens*, p. 329;) but it will be seen that great difficulty has been met with in reducing the prolapsed

life, were resisting and firmly contracted, have on autopsy been found relaxed, yielding, and allowing replacement to be readily effected.

Von Herder[55] was called to a primiparous patient, who had been kept on the chair of delivery for three or four hours, which facilitated the prolapse of the inverted uterus, and also the hæmorrhage; and from these and other causes, particularly from the midwife having cut into the presenting fundus with scissors, doubtful if it were a tumour or the head of another child, the patient was found moribund. Von Herder made an unavailing attempt at reduction; the patient's state precluded further trials, and she expired. On autopsy, the inverted uterus was found more soft, more pale, more yielding; the place where the placenta had adhered, near the terminating orifice of the right Fallopian tube, was still distinguishable, being darker than the rest of the surface. On the peritoneal cavity being opened, foul air escaped. An ounce of bloody serum was found in that cavity, but neither the uterus, Fallopian tubes, nor ovaries, were visible, a vacuity or hollow only being observed behind the bladder, the commencement of a smooth canal that led deep in the direction of the vagina. Von Herder reduced the inversion with ease, and on incising the uterus, found its vessels empty.[56]

inversion in some of the many victims of this displacement. Still, as a general rule, the uterus is flaccid after death, and, in the worst cases, also before death. Dr. Ramsbotham was called to attend the autopsy, and found the prolapsed and inverted organ flaccid, which during life had been firm and resistent. (*Obstet. Med. and Surg.*, p. 541.) A case proved fatal in half an hour, the first Dewees had ever met with. On inspection, the fundus was found dipping three inches into the body of the uterus, which continued in the vagina, and when removed was so flaccid as to be turned inside out with as much facility as a soaked bladder." (*System of Midwifery*, fifth edition, p. 537.)

[55] *Diagnostisch-practische Beiträge, s.* 124.

[56] "Aperui ventrem defunctæ puerperæ. Obierat hæc die præcedente hora quinta post partum, sana alias antea, edito fœtu optimè valente. Exhibuit se hic uteri fundus ad interiora illius conversus, sicque ad pudendum usque prolapsus, adeo ut vagina tota corpore hoc uteri inverso replereretur, quod etiam arcte adeo a contracto utero detineabatur, ut non nisi robore summo, atque violentia, ope per pudendum immissi instrumenti, sursum detrudi, sicque in naturalem locum reduci potuerit. .....Vasa omnia sanguine hic adeo destituebantur, ut etiam quocunque loco cultro anatomico aperta nil ejus funderent, subsidentibus in totum tunicis; quem etiam sanguinis defectum ex immoderato fluxu, ob secundinæ violentam separationem extractionemque causatum, mortis subitaneæ causam judicamus." (*G. Blasii, Obs. Med. Rariores*, p. 42. *Wachter, de Prolapsu et Inversione Uteri*, p. 22. *Halleri Disput. Chirurg.*, iii, 567.)

Dr. James Wilson, of Glasgow, has kindly communicated to me the particulars of a case of midwifery, attended by a medical student, in which the symptoms made speedy progress to a fatal termination. After the child had descended to the perineum, one pain expelled it, and another effort drove out the placenta, followed by the inverted uterus. Although not much blood was lost, the patient was dead in an hour and three quarters, and just before efficient aid arrived; the paralyzed student had not been able to do anything for the patient's safety. On autopsy next day, Dr. James Wilson found the uterus completely inverted and prolapsed at the vulva, with the placenta still adhering to its fundus; the adhesion was morbid, and it required considerable force to separate the placenta; still the unusual adhesion of the placenta was not to be ascribed to any formidable disease in the uterus itself, as Dr. James Wilson considered that, had a person of sufficient experience seen the patient in good time, the uterus might have been replaced, and the fatal issue prevented.

My friend, Professor Berry, was called to a case scarcely less appalling; the patient died before he arrived, and immediately on the placenta being detached from the fundus by the surgeons already in attendance; the inverted and prolapsed uterus was lying flaccid between the limbs; the inversion was total, and the cervix distinguishable only by being somewhat thicker than the inverted vagina, with which it was continuous. The cervix is uncontracted, and there are shreds of the placenta still adherent to the inverted uterus, which forms a hollow pouch, about eight inches long, and near its lower part about six inches wide. The preparation is preserved in the museum of Queen's College, Birmingham, and the hollow pouch, at my request, has been laid open, showing that both ovaries and Fallopian tubes were contained in it, and that the walls of the uterus were so relaxed and so delicate as to be, in some parts, not a quarter of an inch in thickness. I possess two splendid drawings of this preparation, from the pencil of Mr. Samuel Moreton, but they are too large for publication in this Essay.

The most remarkable specimen of recent inversion that has been obtained on autopsy, is preserved in the museum of the Middlesex Hospital, in London, and of which, through the liberality of Dr. West and other gentlemen connected with that establishment, I have obtained a drawing, also too extensive for publication. Not only the uterus, but the whole of the vagina, are inverted in this

case, forming an external pyriform tumour of sufficient length to reach below the knees of the patient. The length of the tumour from the superior limit, where the inverted vagina is joined to the external labia, to its lowest part or fundus, is above fifteen inches, and the largest diameter is ten inches. The open orifices of the uterine sinuses are generally oval and of great size, some being half an inch in their largest diameter, and the whole membrane forming the external covering of the uterine tumour is flocculent and loose, all indicating the very relaxed condition of the organ, such as could not fail to lead speedily to the extinction of the patient's life.

The latest contribution to the autopsical evidence on uterine inversion, when fatal in its *recent or acute stage*, is just furnished by Dr. Christie,[57] of Aberdeen, and contains remarks of considerable value to every student devoted to the subject.

Upon this displacement in *the chronic stage* the documents are much more numerous and extensive, and many of them may be deemed worthy to be fully quoted, as they are suited, when presented in a concentrated form, to throw some light upon the more difficult parts of the subject to be hereafter considered. In attempting a rapid summary of these intrinsic sources of information, I shall not adhere to chronological order as regards the authorities, but rather to the duration of the malady ere it proved fatal.

The knowledge of a case of chronic inversion of the shortest standing where autopsy was performed has reached me through my valued correspondent at Philadelphia, Dr. C. D. Meigs. It

[57] There was sudden and considerable hæmorrhage, which abated; but stimuli did not rally the patient. The inverted fundus and body of the uterus occupied the vagina; the cervix encircled the highest part like a collar. The patient was no longer living when Dr Christie arrived: next day he conducted the autopsy. "Externally the body had a very pale and ensanguined hue. On placing the hand over the hypogastric region, a cup-like depression, bordered by a prominent convex ring, was found in the situation of the fundus. When the abdomen was opened, its viscera presented the same bloodless view as the body externally, &c.....The ovaries lay at each side, on the posterior edge of the cup-like depression. The uterus was very lax, and evidently only slightly contracted. When the inversion was reduced, which was easily done, the fundus reached an inch or two beyond the umbilicus. The inner surface of the uterus presented nothing remarkable. A few small clots of blood were found on it, and the seat of the placenta corresponded to the fundus, to which it had been attached, rather more to the left and behind, than to the right and in front."—*Monthly Journal of Medical Science*, May, 1846, p. 356.

occurred in a delicate, sensitive lady, not twenty years old, and the inverted uterus was put back into the vagina, under the belief that it was a simple prolapse. When Dr. Nourse, who describes the case fully, was called, it was too late to succeed in reducing the displacement, and, indeed, no persevering attempts were admissible, owing to the great exhaustion from loss of blood, the great tenderness and mobility of the part, the anxiety of mind, and the highly impressible state of the nervous system. The patient returned to Dr. Nourse, six or seven months afterwards, in a state of extreme anæmia and exhaustion, followed by speedy dissolution. It was found on dissection to be partial inversion in the extreme degree, and the uterus had diminished to nearly the natural size. Its texture was but little, if at all, changed, the only appearance, besides the displacement and deformity, being the greater redness of the lining membrane of the uterus now forming the external covering of the tumour, and its unusually smooth and glistening surface.

In reference to the case of partial inversion, fatal at nine months, and represented in the first part of this Essay,[58] the late Dr. Ingleby, who conducted the inspection after death, observed to me that, in addition to the displacement of parts, there was found no diseased condition, but merely an exsanguineous state. The Paris case, also represented in the first Part,[59] had continued for twenty-two months, when the patient was received into the hospital, pallid, feeble, and without pulse, where she died in fifteen days. The autopsy is detailed by Bayssellance,[60] but is calculated to interest only the curious, and not the hurried practitioner, who reads for immediately available information. Far otherwise is the account published by Lisfranc, of a female about

[58] See plate 7 of Part the First, and description.

[59] See plate 5 of Part the First, and description.

[60] " L'abdomen ouvert, les intestins relevés pour découvrir l'utérus, dans laquelle les trompes et les ligamens étaient engagés ; les ovaires et les ligamens larges étaient flottans sur les parties latérales de la cavité pelvienne, et engorgés. L'ovaire gauche présentait une hydatide ; *la vessie avait un peu* changé de situation : ils firent ensuite une section dans le milieu de la branche horizontale des pubis, qui se terminait de l'un et de l'autre côté, à la partie antérieure de la tubérosité de l'ischium, pour découvrir la maladie sans la changer de position; ils trouvèrent le fond de l'utérus passant par son col, et dépassant son orifice de plus d'un demi-travers de doigt. .....Ils introduisirent avec facilité des stilets dans l'orifice des trompes." (*Thèse sur le renversement d'Utérus* p. 26.

forty-three years of age, in whom the inversion ensued upon a miscarriage[61] at three months of gestation, and who went on for several years suffering much pain, and reduced by leucorrhœa, but having no sanguineous discharge. She was a patient in the Hotel Dieu when forty-eight years old, on account of her uterine complaints, but no vaginal examination was made. She returned to the Hotel Dieu after six months' absence, suffering from enteritis, under which she soon succumbed; and on autopsy, the uterus was found inverted as far as the cervix, (*perversio extrema,*) lodging just within the vulva, and somewhat hypertrophied. A portion of the great omentum,[62] two-thirds of an inch long, had descended into the peritoneal cul-de-sac of the inversion, and formed adhesions, so as to close completely this narrow passage. The Fallopian tubes were drawn down into this same cavity, but neither the bladder nor the rectum had been displaced.

To those who have not had the advantage of witnessing (and very few have,) the autopsies of such cases, the prescrved specimens of chronic uterine inversion are calculated to afford a most valuable substitute; but it is to be regretted such specimens are generally kept entire, and are very imperfectly displayed. Of the numerous specimens which I have myself inspected, I have made strong

[61] See the concluding lines of Section II, of Part the First.

[62] "Nous trouvons l'utérus renversé jusqu' à la partie de cet organe qui forme le museau de tanche. La matrice siége encore dans le canal utéro-vulvaire; elle descend jusqu' à son orifice inférieur; l'organe gestateur est légèrement hypertrophié; son hypertrophie est simple, sans induration, et n'offre d'ailleurs, ainsi que ses annexes, aucune trace d'inflammation: les anses intestinales flottent sur lui; une portion du grand épiploon, de la longueur de deux centimètres pénètre dans son orifice inférieur devenu supérieur; elle y a contracté des adhérences; ellc en ferme presque complètement la capacité déja très-étroite; les trompes de Fallope sont attirées en bas; le rectum et la vessie n'ont éprouvé aucun déplacement." (*Clinique Chirurgicale,* iii., 382-3.) Lisfranc gives the dissection of another case equally interesting. At la Pitié, a woman, aged seventy years, who had long suffered from whites, but no red loss, died from pneumonia under his superintendence. Referring to the uterus, as observed on autopsy, he says—"Je fus très-étonné de le trouver complétement renversé, abstraction fait de la portion qui constitue le museau de tanche. La matrice, abaissée et diminuée de volume, était restée dans le vagin; elle n'avait entraîné après elle ni le rectum, ni la vessie; *une anse d'intestin grêle reposait sur l'extrémité supérieure du renversement utérin, avec lequel elle avait contracté des adhérences et dont elle fermait entièrement l'orifice;* le tissu de l'utérus était celui des personnes d'un age très-avancé; en d'autres termes il ne présentait aucune altération morbide." (*Ibid,* iii., 380.)

complaint of this, and suggested that sections should be made; but I have generally been told in reply, that "it would spoil the preparation," and that "we know well enough the state of the interior." My worthy and scientific friend, Professor Mackenzie, of Glasgow, has risen superior to these prejudices, errors, and unfounded apprehensions, and has allowed me, unconditionally, to examine, in my own dissecting room, and to make public use of the specimen in his possession, already referred to in Part I. of this Essay, and shown in outline figures 9 and 11. I have therefore made a transverse section of this specimen in its whole length, and the divided surface of the anterior half is represented in plate 10,[63] demonstrating the depth of the peritoneal cul-de-sac, and the continuation of the Fallopian tubes to its lowest part, as well as the thickness of the walls of the uterus, and of its uninverted cervix. It is to be hoped that a commencement of the method of displaying the parts in chronic inversion *post partum* being thus made, it may be hereafter pursued to a greater extent. I shall avail myself of a good opportunity of proving the great value of this method, and of correcting an egregious error, in the section on diagnosis.

A lady died, under Dr. King's care,[64] who had for twenty years suffered from uterine inversion, occurring after parturition; and immediately behind the bladder, (which was *in situ*,) and over the rectum, was a blind pouch, where the fundus uteri should have been, and into which the finger entered easily; the ovaria were less than usual, and the Fallopian tubes were apparently shortened, from being drawn down with the inverted fundus uteri.

Almost every writer who has attempted an essay or thesis on uterine inversion has referred to La Motte's case[65] of "*une très vieille Demoiselle*," who had laboured under the malady since her accouchement thirty years before. The disease had prolapsed gradually, and now presented a tumour, about as big as a man's fist, depending between the lower limbs, and fixed at its upper

[63] See plate 10, and also the description of it. Plate 9 shows the same specimen before being incised.

[64] *Glasgow Medical Journal*, i., 173. When Dr. King first examined, being ten years before the patient died, he felt "a firm substance, giving the idea of the round end of a pear, protruding into the vulva; and the finger, being carried an inch and a half higher up, discovered the neck surrounded by a ring, which felt like cartilage."

[65] *Traité des Accouchemens, Obs.*, 425, p. 653. Also the Translation by Tomkins, p. 497.

limit to the whole circumference of the labia, so that there was no proper vaginal cavity, the whole of the vagina being inverted and prolapsed externally, forming the neck (a soft and yielding tube,) to the rest of the tumour, which was the uterus totally inverted. La Motte's further observations were precluded by the decease of the patient; but we have the dissection fully given by Levret,[66] the body having been brought into the dissecting room where he was engaged as a student. It appeared to be the body of a female seventy years of age, and the tumour, much larger and harder below than next the labia, equalled the size of a child's head born at the full term. The small intestines had descended through the pelvis, so as to occupy the inverted vagina. All the uterine appendages were contained in the cavity formed by the inversion; the rectum had been drawn down into the posterior part of the same cavity, and whilst part of the bladder still occupied the pelvis, a prolongation of it descended into the inversion. This prolongation had thinner walls and was the larger portion of the bladder; calcareous deposits were attached to its lining membrane. The urethra took a direction downwards to reach the lower division of the bladder.[67]

Except in the most extreme cases of prolapsed uterine inversion, and where the vagina is also inverted and prolapsed externally, the bladder is not displaced, either in chronic inversion *post partum*, or inversion induced by a polypus. Von Sanden, in the extreme instance already fully quoted,[68] examined the body *post mortem*, and in the figures he has given of the abdominal appearances the bladder is represented as being prominent above the ossa pubis and *in situ;* so in Dr. D. D. Davis's case[69] the bladder was not depressed, nor in any way abnormally situated. In the Dublin case,[70] where the inversion was carried to the greatest degree by a polypus, there is a singular deviation of the inferior fundus of the

[66] *Cure radicale des Polypes, &c.* pp. 132-5. The account is given at great length, the above being only a very short statement of it.

[67] "L'urètre enfin, au lieu de se porter vers la région supérieure, alloit en descendant."—*Ibid.*, p. 135.

[68] See note 97 of Part the First. In Von Sanden's work, Fig. 2 represents the appearances as presented on an abdominal view. Thouret (*Thèse*, p. 12,) admits that, in extreme cases, the bladder is drawn down, and "*en palpant la tumeur on excite le besoin d'uriner.*"

[69] See note 109 and outline fig. 19, of Part the First.

[70] See plate 8 of Part the First, and description.

bladder, forming an exception to the more general rule. If the patient have been subject to descent and retroversion of the bladder in any degree, (as many relaxed and prolific woman are,) before suffering delivery complicated with uterine inversion, then, indeed, the former organ may descend with the latter, which will account for the bladder being sometimes displaced, as writers have described, but more often imagined than discovered in their own experience.

Further illustrations by autopsy will be reserved for the part of this essay where the treatment will be considered, and where such examples will be introduced as are connected with operations performed with a hope of cure, but followed by the death of the patient.

SECTION IX.

ON THE SYMPTOMS AND PATHOLOGICAL EFFECTS OF INVERSION OF THE WOMB.

The signs or symptoms of this displacement are either local or general. They require also to be considered in regard to the degree and duration of the malady, and may be grouped or viewed according to the change in form or position of the organs concerned, the morbid living actions arising in those organs and the parts contiguous, and the constitutional derangements superinduced. On each of these heads much may be learnt from the different cases already detailed, or briefly sketched, in preceding sections of this Essay, and what immediately follows is but a feeble attempt to supply the deficiencies in the symptomatology and pathological effects of uterine inversion.

Simple *depressio*, or the slightest degree of partial inversion, viewed as occurring after the child is delivered and the placenta also, may be unattended by pain, and indicated solely by hæmorrhage and a corresponding depression of the vital powers. If pains occur they result from irregular contraction of the uterus, and the accompanying hæmorrhage proceeds from the depressed part, which is in a state of *inertia*. The depressed part may be discovered through the abdominal parietes, if situated in any portion of the uterus accessible in this way. The fundus being the most

usual seat of *depressio*, the cup may generally be found in that situation, and the most elevated part of the border or circle around the hollow will be anterior, posterior, or lateral, according to the part of the fundus depressed. Further evidence can only be gained by introducing the hand into the uterine cavity, when the seat of the depression will be indicated by a soft and regularly convex prominence. Whenever a doubt exists as to the cause of any considerable and persisting hæmorrhage after complete delivery, this method of investigation should invariably be practised.

As the displacement progresses and becomes *introversio* more urgent symptoms arise, according to the degree of intus-susception, or according to the degree of compression exercised by the uninverted upon the inverted portion of the uterus. The patient describes a degree of fullness, weight, and uneasiness in the vagina, as if something remained to be expelled. These sensations induce expulsive efforts, both uterine and abdominal, particularly the latter, these efforts being most easily revived on account of the susceptible condition of the patient. If the inverted portion of the uterus be still in atony and not firmly compressed, the hæmorrhage will be considerable, but under the reverse circumstances it may be scarcely any. The constitutional effects evince themselves in a much greater degree, irrelative of the coloured loss sustained,—pallor, clammy moisture of the skin, diminished pulse, and all the signs of a severe shock or injury to the system. After a few hours there may be retention of urine. If the *introversio* be in the greatest degree, the tangible evidence, *per vaginam*, consists in a soft substance being felt within the os tincæ, as if there were another placenta. It has often been mentioned as an elastic tumour, like a bladder more or less distended with water. If the *introversio* be less in degree, it can only be felt by introducing the hand through the os uteri, which can readily be done if that muscular circle be not already contracted; thus the degree of the introversion may be correctly estimated by tracing it to the angle where it is continuous with the uninverted part of the uterus. But previous to this investigation evidence should always be sought by feeling through the parietes of the abdomen for the cup or hollow, encircled by a firm margin, and ascertainable in all patients save the most corpulent. The information derivable from this source, as to the depth, size, and situation of the peritoneal

pouch formed by the displacement, is so obvious that it needs no description.

When the inversion has proceeded to a greater degree, the fundus passing through the *cervix uteri,* or this alone remaining uninverted, (*perversio extrema,*) all the painful and distressing symptoms are usually aggravated in an extreme degree, and particularly the nervous symptoms; there are clammy perspirations over the entire surface of the body, cold extremities, vomiting, most alarming distress and restlessness; the pulse quick, small, 120 in a minute, or, perhaps, scarcely perceptible; fulness and painful distension of the pelvic cavity, pains in the loins, groins, and down the lower limbs. The hæmorrhage in this stage varies, according to the constriction of the inverted part of the uterus by its cervix, and the contracted or relaxed state of the inverted portion itself. If the cervix constrict moderately, it promotes the hæmorrhage; if powerfully, it may entirely suppress the hæmorrhage, but the nervous symptoms will become more urgent, and convulsions, delirium, syncope, will appear to threaten dissolution. This is, however, the worst picture: if the cervix be relaxed, and the inverted part of the organ contracted, the hæmorrhage being slight, all the symptoms will be milder, and the bearing down, uneasiness, and restlessness, may awaken no suspicion, until retention of urine requires the surgeon's aid.

The vagina is filled by the inverted body of the uterus, which is soft or yielding, like another placenta, or tense and firm, like the head of a second child, answering to its contracted or its atonic condition and the constriction exercised upon it by the cervix. The finger carried to the greatest depth of the tumour, finds it encircled by a ring, varying in size in different cases, and even in the same case: this is the cervix uteri, and if it be relaxed the finger can be passed within it for some depth, till it reaches the angle formed by the reflexion of the uterus. Thus a circular cul-de-sac, varying in depth as the *perversio* is greater or less in its degree, can be traced all round the neck of the tumour; but the vagina is often so occupied by the inverted mass, as to preclude the hand from fulfilling these objects, or the finger from even reaching the cervix. Reliance for further and immediate evidence must be placed on the making of an examination through the abdominal parietes, when the hollow leading to the peritoneal cul-de-sac of the inversion

may be felt at the upper part of the uterus,[71] sometimes a little above the pubis, at others, near to the navel, according to the relaxed state of the perineum, the capacity of the pelvis and vagina, and the bulk of the inverted organ. If the case be partial inversion in the greatest degree, (*perversio usque ad cervicem,*) the vagina is so distended with the mass, that the action of both the rectum and the bladder is interfered with; retention of urine is almost an invariable consequence, and the surgeon first discovers the tumour in the vagina, on being called upon to use the catheter two or three days after delivery. The fundus, situated just within the external labia, may be exposed to view, and is of a florid or dull red colour, or more rarely of a pale red, if there have been much sanguineous loss. The surface of the tumour possesses very little, if any, sensibility under certain conditions; but if time have elapsed, and inflammatory action have ensued, or the circulation of the part be considerably interrupted by the constriction of the cervix, or the uterus contracted, a high degree of sensibility will be evinced,[72] sometimes sufficient to warrant the remark that it is tender, and even exquisitely painful when touched.

[71] Plates 2 and 3 of Part the First, which are *one-fourth* of the natural size, but erroneously stated in the description to be *one-half*, will serve to give some idea of the size of the opening into the peritoneal cul-de-sac in recent inversion, when the cervix is relaxed; but when contracted, it is of much less size, leaving comparatively a very small aperture to be felt through the abdominal parietes, so that a careless examiner might not detect it, but pronounce that the uterus was contracted, and *in situ*, although actually in the condition of *perversio extrema*. There is no doubt such errors have occurred. When in *introversio* the organ remains in the abdomen, the circle marking the angle of reflexion, and the entrance into the cul-de-sac, are always comparatively large.

[72] For remarks as to sensibility of the recently inverted uterus, see Section II. of Part the First, in the same page as notes 69 and 70. The subject deserves to be further pursued, being regarded as affording a pathognomic sign of the disease. Burns refers to a preparation of the inverted uterus in Dr. Montgomery's possession, "which had, during life, been quite insensible to the application of the needle." (*Midwifery*, ninth edition, p. 561.) A. Hunter states that "the womb, when not in an inflamed state, may be handled, and even wounded, without pain; and at eight days after delivery, when the inverted organ first prolapsed externally, he squeezed it with considerable force, and it appeared insensible." (*Duncan's Annals*, iv., 375.) Boyer seems to have regarded the inverted uterus as "insensible au toucher" only when "molle, flasque et sans force." (*Malad. Chir.*, x., 498.) In a case of chronic inversion, Bloxam found that "it bore handling, and even pinching, without pain; pressure with the nail occasioned some, but it was by no means so sensible as the os uteri." The relaxed state of the cervix in this case, "allowing the finger to be

If the inversion be total, so that no constriction is exercised by the cervix, and if the uterus be still contained within the labia, the symptoms are milder, the hæmorrhage is little or none; and in tracing the tumour to its greatest depth, you find only a circular ridge or thickening, answering to the inverted cervix, without any lip or edge; and above this ridge is the reflected vagina ending *en cul-de-sac* all around the neck of the pear-shaped tumour, but the finger cannot reach this depth, unless the hand can be admitted; indeed, in total inversion, without prolapse, the inverted organ may mount so high in the abdomen as to rise much above the ossa pubis, even near to the navel,[73] as has just been stated in considering extreme *perversio*; and the colour of the fundus,

passed between it and the tumour," showed there was no inflammation present. (*Johnson's Med. Chir. Rev.*, xxvi., 169.) Newnham represents the tumour as "exquisitely sensible," (*Essay*, p. 3;) and his pupil, Windsor, at thirty-six hours after delivery, found the inverted organ, as large as his fist, in the vagina, "hard and rugous and tender to the touch," (*Med. Chir. Trans.*, x., 358;) but it had descended a second time after being pushed back, and must have undergone irritation, as well as being contracted. On the fourth day, Cleghorn represents the tumour to have been "so tender, it was impossible to examine it accurately, or indeed at all;" it was, of course, highly inflamed. (*Med. Communications*, ii., 227.) In *perversio*, reduced within two or three hours, Sancerotte observes, "fortement étranglé par l'orifice de cette organe, cette partie du fond de la matrice étoit très douloureuse." *Mélanges de Chirurgie*, p. 339.) Saxtorph, called to a recent case of *introversio*, found "eine runde Geschwulste, wie eine mit wasser angefülhte Blase anzufuhlen und bei der Berührung sehr Schmerzhaft;" although easily reduced, and followed by recovery, it had been mistaken for a polypus, and roughly handled. (*Gesammelte Schrift.*, p. 306, and *Fries Abhandlung*, p. 34.) Were I to multiply quotations, they would exhibit the same *varieties of experience* upon this head; and how are *they* to be reconciled? By defining in what sense the term sensibility is used; by describing its varieties, and distinguishing the textures to which each is common or peculiar; by considering whether the parts be quiescent and healthy, or congested, irritated, inflamed. Moreover, between contiguous textures that are differently sensible, there is a sympathy; you excite muscular contraction by handling the inverted part, or by acupuncturation, without causing any sensation in its membranous covering; but if that covering be inflamed, contraction of the deeper structure will more readily ensue. The sensibility of the parts implicated in uterine inversion varies, therefore, not only according to the agents employed, as remarked by Lisfranc, but according to the healthy or morbid condition of the different textures themselves at the time of such application. The subject will be resumed under diagnosis, in Section XI., note 179.

[73] See the case by Horteloup, with illustrative drawings, in *Rep. d'Anat. et de Phys. Pathologique*, ii., 229; also note 61 of Part the First of this Essay. Dailliez (*Thèse, Obs.*, 12ième,) may be sought for the same purpose, and note 38 of Part the First.

brought under ocular inspection at the labia, will be observed to be florid or dull-red. In each lateral aspect of the tumour the round ligaments may be felt *per vaginam,* and traced upward to the brim of the pelvis, as tense cords. The severity of the symptoms is not, as some have stated,[74] in direct proportion to the degree of the inversion; for total may be accompanied by less urgent symptoms than partial inversion, although the latter be in the extremest degree; but if the patient survive, sooner or later, under the feeling, too often deceptive, that the rectum or bladder requires to be evacuated, expulsive efforts are made, and the inverted organ is thrust out from the vagina, and depends externally as a vascular, florid, or dull-red mass, somewhat pear-shaped, imperforate below, and marked by an irregular or jagged surface, where the placenta had once adhered, with or without an encircling cervix, according as the degree of the inversion is partial or total. This prolapse is the worse, the more rapidly it is effected, and the earlier it happens after delivery; and it may be attended by all the worst signs of severe shock to the living system,—extinct pulse, cold sweats, hurried respiration, sickening pains in the loins, groins, hypogastrium, extending down the lower limbs, even to the heels;[75] pallor, tossing, syncope, delirium, subsultus, death! In complete prolapse, the finger introduced within the labia is soon stopped by the reflected vagina, which is partly inverted, and often appears externally, forming the uppermost portion or neck of the prolapsed mass, which may depend from six to eight inches, or even to twice this extent, reaching down nearly to the knees of the patient. On palpation a vacancy only is felt above the ossa pubis, the uterus having completely deserted the abdominal and pelvic cavities, which are occupied by the bowels.

In the worst cases, the stages of the displacement, as above enumerated and separately defined, although marked by symptoms in some degree appertaining to each peculiarly, are found to succeed

[74] See the Reviewer of Kilian, in *Forbes' Brit. and For. Med. Rev.*, iii., 426. "The severity of the symptoms depends on the degree of the inversion; if the fundus pass the *os uteri*, there may be an approach to strangulation and the most alarming symptoms; in complete, there is no strangulation, and the uterus being capable of contracting, there is much less hæmorrhage."

[75] "Douleurs violentes; elles s'irradient dans les aines, dans le bas des reins, dans les flancs, sur l'ombilic, sur la région hypogastrique, le long des cuisses, jusqu' aux talons." (*Lisfranc, Clin. Chir.*, iii, 387.)

each other so rapidly as to be but one continued and uninterrupted action; the uterus, from having occupied the abdomen as usual, at the close of delivery, and with its fundus reaching nearly to a level with the navel, is driven downwards by two or three torturing expulsive efforts, passing rapidly through its own cervix and through the vagina, till it prolapses between the limbs of the sufferer, who expresses that she feels all her bowels torn away, and rapidly sinks under the loss and shock attendant on so instantaneous and rapid a displacement.

The preceding accounts in this section refer to inversion as it presents itself after the placenta is removed; but not unusually the displacement commences at, or just before, the birth of the child, and progresses to the last or greatest degree whilst the placenta is still adhering more or less to the fundus. Under these circumstances the placenta, being pressed on and supported by the inverting fundus, gives the idea of its being larger and firmer than common.

When the accoucheur pulls the funis, at the same time feeling above the pubis, he detects the depression, and finds that it deepens according to the extracting force applied; but if the funis be no longer pulled, the depressed part somewhat recovers itself. Sometimes the placenta, with the inverted fundus, is thrust out at the external labia by a single effort; at others, advancing more slowly under expulsive efforts, both abdominal and uterine, it at length prolapses externally with the *fundus uteri,* presenting an uniform and enormous mass, most puzzling to the accoucheur when he proceeds to remove the whole and finds it continued into the vagina and still united to the body of the patient. Without any morbid adhesion the placenta may be so firmly united to the relaxed fundus as to be separated with difficulty, imposing upon the less experienced observer, who can scarcely believe that the adhesion is not preter-natural. I feel assured that this intimate union between the inverted uterus and the placenta is stated to be morbid when it is not so. To effect the separation, or even to find out the line of demarcation between the two textures, is difficult, so long as the inverted organ is in inertia. If the placenta be partially detached, blood flows freely, threatening destruction to the patient; if the case be misunderstood or concealed, as has often happened, the placenta may remain adherent for many

hours,[76] and the patient die from the nervous shock and the exposure to the air of so extensive an internal surface, without much loss of blood.

After the placenta is removed, the inverted organ, still remaining prolapsed, is of a soft and spongy texture, so relaxed that it has been compared[77] to "a loose piece of tripe." In this condition it evinces no common sensation, but cannot be said to be insensible, as, under handling, the contraction of the muscular fibres is aroused in all save those cases where there is irrecoverable collapse, and the firm texture beneath is felt through the soft and sanguineous membrane covering it. Whilst relaxed, the prolapsed inversion, of a dull red colour and exuding an abundant sanguineous mucus, is of an irregular shape, flattened anteriorly and posteriorly, glabrous, and very evasive under pressure; it only becomes regularly convex and pear-shaped[78] when contraction is established.

Whether the inversion still rest in the vagina, or be prolapsed externally, it is always contracted and pyriform, and furnishes an abundant mucous secretion a day or two after delivery. If the patient brave all dangers, the symptoms abate very considerably after a week or two; all sanguineous exudation ceases, leucorrhœa only remaining; the decrement of the organ goes on as it would do naturally, relieving all inconvenience, if not before relieved, in the urinary and fæcal evacuations, until, at about the expiration of six months, it arrives at the size which the unimpregnated uterus normally presents. Even external prolapse, if it have not occurred

[76] The mother of thirteen children was delivered (footling) of a fœtus in a very sphacelated state; the funis, being also very putrid, broke; excessive pains and forcing down continued, hardly to be conceived, followed by prolapse of the inverted uterus. with the placenta perfectly adhering to its fundus. There was no hæmorrhage; the uterus was replaced without any separation of the placenta, which was not expelled till *the expiration of five days*—recovery. A blow upon the uterine region, after which the mother never felt the fœtus, was imputed as the cause of its decease. Could the blow, by injuring the uterus where the placenta was attached, have disposed to the inversion? (Tobias Browne, in *Mem. of the Med. Soc. of London*, v., 202.)

[77] See Lucas's case in *Smellie's Midwifery*, iii., 445.

[78] See Troussell's case in *London Medical Repository*:—"A phthisical female, her third labour. On the day after delivery the inverted womb prolapsed, under efforts to evacuate the bladder. In size it equalled two fists—pear-shaped, of a pale red colour; everywhere smooth, except irregularities where the placenta had been attached. It was reduced, but again protruded during a fit of coughing, and was more easily reduced—recovery."

during the first two or three weeks[79] after delivery, rarely, if ever, occurs during the remainder of the period of decrement. If the patient rallies sufficiently to suckle her infant, ample experience has proved that, the first inflammatory and febrile disturbance being over, the inverted uterus, during the stage of decrement, and even after it has subsided into the chronic stage, may give little inconvenience, and excite no serious constitutional disturbance, so long as lactation[80] is continued. A mucous loss is, however, always present, with some uneasiness, fullness, and bearing down; and when the patient is in a condition to have the menstrual loss established her troubles greatly increase, sanguineous discharges occur, either almost constantly or at regular intervals, rarely with the full and correct interval, wearing down the strength of the system rather by frequent recurrence than by great losses at stated times. This symptom is more severe and injurious, as the woman is further distant from the critical age, or as she is called upon to perform conjugal duties. The leucorrhœal loss always occurs in the intervals between the sanguineous. The severe pains, lumbar, hypogastric, inguinal and femoral, cause great distress; and although a proportion of females thus unfortunately afflicted, but possessed of strong constitutions, contend with the disease, and follow their ordinary avocations, all who are of delicate fibre and of much sensibility, are brought in a few months to the utmost danger, until œdema of the lower limbs, general anæmia, and inability to meet any exertion, pourtray the bloodless and exhausted state of the frame and the imminent danger to life.[81] This is very

[79] See the conclusion of note 63 of Part I. for dates at which recent inversion has prolapsed, from one to fourteen days after delivery.

[80] The following explanation has been offered upon the influence of lactation:— "Während dieser Funktion, die Gebärmutter als todt, wenigstens als ein unthätiges und funktionfreies Organ angesehen werden kann. Nach dem Entwöhnen aber wird diese scheinbare gesundheit wieder gestört." (*Busch und Moser*, *Handb. der Geburtskunde*, ii., 432.)

[81] "L'inversion incomplète entraîne des accidens plus graves que les chutes ou les descentes proprement dites de la matrice. Les hémorrhagies répétées qu'elle cause épuisent graduellement les femmes, et finissent par amener la mort. Les malades ne peuvent se lever, faire le moindre exercice sans être menacées de syncope, réssentir un poids, des tiraillements qui les effraient bientôt. Une dame, après quatre ans de souffrance, était pâle, anémique, déjà prise d'enflure aux pieds, digérant bien d'ailleurs, ne pouvait point sortir de son lit, perdait sans cesse soit en rouge soit en blanc." (Velpeau, *Méd. Op.*, iv., 419.)

usually the current of events in *perversio extrema*, the most frequent degree of uterine inversion, and to which the preceding detail may be regarded as particularly applicable, for of *depressio* or *introversio* in the chronic stage we have very little information to be relied upon, which affords a strong indication of the comparative rarity of these lesser degrees of the displaecment.

On examination the tumour in the vagina is met with, the size of a small pear, flattened a little anteriorly and more so posteriorly, scarcely above two inches long; if uninflamed and uncongested, smooth on all its surface, bleeding easily from the touch; more or less sensible to pressure; surrounded at its neck, its narrowest and deepest part, by a circular band, within which the finger or other instrument can be carried, detecting a circular cul-de-sac, of equal depth, less than half an inch, all around. This tumour, if not inflamed and not constricted by the cervix, is moveable, and although not insensible to pressure, is scarcely painful. If occular inspection be obtained, the covering velvety membrane is found of a pale or florid red colour.[82] Examining by the rectum affords further evidence of the size and limits of the tumour, and the finger passed beyond the level of the encircling band or cervix, finds no resisting solid body, but ascertains the absence of the uterus, and on pressure being made at the same time above the pubis with the other hand, it may be possible, provided the urinary bladder be empty, to discover a ring or circle within the confines of which is a small depression; but only in very thin patients, such as have become emaciated by the continuance and baneful effects of this malady, can this discovery by made.[83]

If, in spite of the suffering, exhaustion, and annoyance arising from this disease, the patient continues to live, sooner or later, within a few months or after several years, unless its nature be fully understood, and due precautions used under medical direction, the inverted organ prolapses externally,[84] and often descends low between the limbs, suspended by the inverted vagina as its

[82] In chronic inversion, Boivin and Dugès found the inverted uterus of a pale red colour, observed in the vagina, (*Mal. de l'Utérus*, plate xii., fig. 2,) and I find several authors stating the same; but more commonly the colour is florid red.

[83] Baudelocque testifies having been able to discover the ring or circle alluded to in a case of chronic inversion. It is more likely to be detected in partial inversion (*perversio extrema*,) where the circle is firmer, than in total inversion, in which the circle affords less resistance, and is less distinctly defined.

[84] See notes 93, 94, and outline fig. 12, of Part the First.

peduncle. In this state of parts, the evacuation of the contents of both bladder and rectum becomes a source of irritation; chronic inflammation, thickening and induration of the parts ensue, dryness of surface from exposure to the air, eruptions, ulcers, until from enlargement of the mass and morbid sensibility, it is no longer reducible into the vagina.[85]

If the patient escape external prolapse and maintain tolerable health until she reaches the critical period, (which few do who date the inversion from early life,) then, indeed, under a cessation of the menstrual loss, so great a source of irritation and exhaustion, she may go on for many years, suffering only from leucorrhœa; but if not prematurely cut off by some other malady, she will die of the uterine inversion, which, even when in the mildest form, that of total inversion, never settles into so quiet a state as to become quite innocuous.

A review of the more prominent symptoms and complications of uterine inversion will, it is hoped, supply some of the omissions of the foregoing pages of this section, which I may have incurred in moments of rapid composition, amidst frequent interruptions.

The mucous membrane which should line the uterus having become the external covering of that organ, never ceases to supply an abundant mucous secretion, save when it is acutely inflamed, or when the menstrual loss is present. This mucous discharge commences as soon as the coloured loss abates after delivery, and is rendered muco-purulent whenever the membrane furnishing it is in a state of congestion or irritation. If the inverted part have prolapsed externally, although quickly replaced in the vagina or perfectly re-inverted, the discharge is offensive, and even fœtid, for some days; and it may be so even where there has occurred no prolapse externally. In chronic inversion the mucous discharge is subject to less variation, but tends greatly to weaken the patient and hasten the cachectic state. Le Roux[86] thought that the most

[85] See *Traité des Accouchemens, par La Motte*, p. 655. The prolapse was a foot long; adhering above to the external labia, its neck, formed by the inverted vagina, was of the size of a child's arm for three fingers' length, and terminated in a large body, like a gourd, covered with eruptions. A knowledge of this disease was disseminated, for the author observes,—"Elle montre sa maladie à tous ceux qui veulent la voir."

[86] "Plusieurs ouvertures de cadavres ont prouvé à Leroux, de Dijon, que les écoulemens habituels des femmes après leurs couches n'étaient souvent entretenues que par une dépression méconnu de la Matrice. (Murat, in *Dict. des Sc. Med.*, xlvii., 483; also Ferrand-Demissols, *Thèse*, p. 30.)

frequent source of obstinate leucorrhœa was *depressio,* and the idea has been sanctioned by high authority, but no demonstrative proof has been added in support of this opinion. I do not feel justified in applying my own remarks upon this head further than to total inversion, and the greatest degrec of partial inversion, whether in the recent or the chronic stage.

Hæmorrhage is observed to be one of the most appalling accompaniments of sudden inversion after parturition ;[87] still cases are met with proving fatal, and even very spcedily fatal, where the loss has been less than is usual in a common and successful delivery.[88] Ample opportunity seems therefore to be afforded for discussing this subject and endeavouring to reconcile conflicting experience by new, or collated evidence, and calm ratiocination. Undoubtedly the most dangerous and profuse hæmorrhage is met with where the inversion has transpired rapidly, and, as it were, *spontaneously,* with the least interference from without, and where the placenta remains partly detached and partly adherent.

[87] Numerous instances might be referred to where the patient sank rapidly under profuse hæmorrhage, several pints of blood being lost. Where the placenta was partially detached, Helsch found four or five pints of blood in the bed. (*Siebold's Journal der Geburtshülfe*, viii., 419.) Under similar circumstances, Martin-le-Jeune (*Memoires de Med. et de Chir.*, p. 190,) states seven or eight pints to have flowed, and death ensued, "sans doute à cause de la perte totale du sang."

[88] In *perversio* prolapsed externally and remaining long enough for the temperature to be perceptibly lowered, it is stated that scarcely a drop of blood was lost; the placenta was adhering when the accoucheur arrived, and the part was reduced with a favourable result. (*Thom's Erfahrungen*, &c., s. 55.) Of six examples reported by Dr. Radford, the hæmorrhage was not great in any one, although several of them were attended by threatening symptoms of dissolution. (*Essays on Midwifery*, No. 5.) The patient expired soon after reduction of a prolapsed inversion. The writer asserts it was not from hæmorrhage, which had been slight; the placenta was still attached when he arrived. (Albers, in *Duncan's Annals*, v. 390.) The late Professor Hamilton, on an experience of several fatal cases, asserts that death was not from hæmorrhage, which was trifling, but "to be imputed solely to the deliquia and convulsions." (*Duncan's Med. Comment.*, xvi, 327.) The highest authorities, from Dailliez to the present time, affirm without hesitation, that so long as the placenta is completely adherent, the hæmorrhage is trifling, whatever be the degree of the inversion. "Tant que l'arrière-faix reste attaché partout à cette tumeur, il n'y a point d'hæmorrhagie, mais elle s'annonce aussitôt qu'un point s'en detache, et augmente à mesure que de nouveaux s'en separent et laissent à nu une plus grande surface." (*Thèse*, p. 77.) This will explain the remark of Burns, (*Midwifery*, p. 518,) that "frequently complete inversion is not accompanied by hæmorrhage, whilst a very partial inversion may be attended with a fatal discharge."

Repeatedly the surgeon has observed the blood to flow from the surfaces exposed by this partial separation, but probably without correctly distinguishing from which of these two surfaces it proceeded,[89] uterine or placental.

It cannot be denied that there are three sources from which the hæmorrhage may proceed, and which deserve to be separately considered—the detached surface of the partly adherent placenta, the uterine surface to which the placenta was affixed, and the rest of the mucous surface of the uterus. Whatever part of the uterine structure is in atony,[90] or uncontracted, a certain degree of vitality still remaining,[91] the corresponding mucous surface will be the seat of hæmorrhage, the sinuses being patent. The loss may be by a slow exudation, rather than active or considerable; and it will diminish or cease, as proper and perfect contraction of the organ is accomplished. So long, however, as the uterus, or part of it, remains soft, relaxed, and insensible to external impressions, the loss will continue. The best authorities, those most able as well as most experienced, represent the part of the uterus to which the placenta was adherent to be more frequently in atony than any other, being at the same time the almost constant seat of the commencing inversion, and the chief source of the uterine hæmorrhage. The placental is, however, the most active of all the sources of hæmorrhage; whether the maternal blood be obtained by absorption, or by direct continuity of vessels, it is rapidly obtained, or the loss from the free surface of the placenta could not be so abundant as has been many times noted. A correct knowledge of these physiological points is very influential in determining the required treatment. The living after-birth obtaining, by the part still adherent, the blood which flows from the surface of the portion detached, it is difficult to determine with

[89] The part from which the placenta was partially detached was pouring out its blood with great violence. (Edwards, in *The Lancet*, p. 383 of vol. i., for 1845.) T. Herbert Barker felt in the vagina the blood flowing abundantly from the rough surface of the inverted uterus, to which the placenta had been attached. (*London Med. Gaz.*, April 12, 1845, p. 43.)

[90] Inertia, indispensable as a cause of hæmorrhage, is afterwards kept up by the inability of the inverted uterus to contract regularly and completely. (*Boivin and Dugès, Dis. of the Uterus*, by Heming, p. 119.)

[91] In Darvill's case, which occurs in a subsequent part of this section, (note 111,) there was no hæmorrhage; the uterus was not only in atony, but almost lifeless.

any precision what is the proportion of these opposite states of the placental mass most conducive to the loss. It can scarcely be right to assert that the loss from this cause will be in direct proportion[92] to the placental surface actually detached. It is testified by several writers that the hæmorrhage ceases, or greatly diminishes, on the placenta being wholly separated;[93] and when we reflect that this separation takes place, especially when spontaneous, not by any change in the placenta itself, but by the active and normal contraction of the corresponding part of the uterus, the testimony will not be controverted. When only half the placenta remains adherent, the portion of uterus from which the rest has been detached is, perhaps, unfavourably circumstanced for contracting perfectly. The effect of completing the *decollation* is to place the uterus in a condition to contract; and the hæmorrhage ceasing, in so far as it was supplied by the uterine surface, depends on the contraction taking place. But the artificial separation of the placenta may be deemed less certain to put an end to hæmorrhage than the throwing off of the placenta by the spontaneous action of the uterus itself. The uterine contraction by which hæmorrhage is arrested precedes in the one case, and *may follow* in the other. Still, after the placenta is removed, if the part of the uterus to which it was attached do not contract, but remain in a state of inertia, or, as it has been denominated, *paralyzed*,[94] it may be expected that hæmorrhage will continue until such a degree of uterine action transpires as will close the sinuses. It will be advantageous, irrespective of all theory, to distinguish between the passive hæmorrhage, or gradual oozing from the imperfectly contracted portion of the uterus, and the active and rapidly destructive loss effected through the living and partially adherent after-birth.

[92] La perte "est relative à l'étendue de la portion de délivre qui se trouve décollé." (*Obs. sur les Pertes, &c.*, seconde edition, p. 26.)

[93] The doctrine that hæmorrhage ceases, or greatly diminishes, on the placenta being completely detached, is carried too far by one author, who says that if there be no hæmorrhage, it shows the placenta is separated. (*Lassabe, Thesis*, p. 10.) The after-birth being completely adherent, most effectually prevents the loss.

[94] "Paralysirung der Placentar-Insertionstelle des Uterus." (*Handb. der Path. Anat.*, iii, 555.) An earlier writer had applied the same to the uncontracted state of the uterus, whether particular or local, "une espèce de paralysie, qu'on a encore appelé syncope." (*A. E. de St. Amand, sur les Pertes*, p. 59.)

The severe hæmorrhage in recent inversion mostly follows quickly upon the delivery. It may go on severely so long as the placenta remains partially attached, and, in so far as it is furnished by the uterus itself, continue for hours, or first show itself in a considerable degree when several hours, or even a day or two, have elapsed. In *perversio* the constriction of the cervix will have an influence upon the loss,[95] but all constriction being removed by the inversion becoming total, the hæmorrhage is diminished, if not completely suppressed. Although hæmorrhage, as is well known, may persist and prove fatal both in the first and second degrees of partial inversion, the third (*perversio,*) must be considered as still more calculated to give rise to destructive loss. I apply all the preceding remarks to recent inversion.

Menorrhagia is also one of the great evils of chronic inversion; it has, for the most part, reference to the menstrual period, and often ceases in those patients who, after being affected with uterine inversion many years, arrive at the critical age. The entire uterine surface contributes to this loss, and its irregularity and abundance are greatly influenced by the constricting cervix, *perversio* being the most frequent form in which the chronic inversion presents itself. The membrane covering the inverted portion of the uterus has been found at the menstrual period to be softer, thicker, and more vascular. When the part is prolapsed, the oozing of the red loss has been repeatedly observed, and when it rests still in the vagina, ocular evidence may, with the aid of the speculum, still be gained.

The pains experienced where there is uterine inversion after delivery are very severe, particularly in all the greater degrees of

[95] The influence of the encircling cervix, in increasing or in controlling the hæmorrhage, has been often noticed —"Primo instanti major adest hæmorrhagia, quæ paulò-post minuitur contorsione vasorum, et compressione collo facto." (*Deleurye, Thèses,* p. 12.) "The os tincæ, by pressing the fundus uteri violently, prevents the blood from flowing into the large arterial trunks." Hamilton, in *Med. Comment.*, xvi. 327.) This same author takes another view, referring to *perversio extrema* with prolapse:—"The ligaments through which the large blood-vessels pass to the uterus, must be lacerated or very much stretched; in either of which cases the passage of the blood will be stopped. The branches of the hypogastric, which enter the uterus at its cervix, serve in such cases to nourish it, and hence prevent mortification." (*Ibid.*) When the cervix contracts firmly in *perversio*, "on conçoit que dans cette circonstance, l'hémorrhagie doit être arrêtee par la cause même qui produit la mortification." (Martin-le-jeune, *Mem. de Med. et Chir.*, p. 212.)

the displacement, and not only occupy the pelvis, but extend to the loins, groins, abdomen, and down the lower limbs, as before mentioned. The earliest writers,[96] from Ambrose Paré downwards, until a very recent date, ascribed these pains, and also the deliquium[97] so often met with, to the stretching and violence inflicted on the ligaments of the uterus. The pains, however, must rather be ascribed to the nerves generally connected with the uterine organs, directly or indirectly, and not restricted to one class of nerves. Pains, more or less in degree, attend every stage of uterine inversion, except, perhaps, the smallest degree, *depressio*. The inverted mass, distending the vagina preternaturally, causes pain: another source of pain, accompanied by nausea, vomiting, and great depression of the vital powers, is attributable to the constriction of the cervix uteri in *perversio*. It is demonstrated that the pains in the groins are produced by the stretching of the round ligaments;[98] and it may be reasonably inferred that other textures in which nerves abound will, from the same cause, become the source of pain. As to *depressio*, in which it has been asserted no pain attends,[99] and where the syncope, if produced, can only

[96] Before the inverted uterus was fully distinguished from direct prolapse of the organ, this displacement was attributed to relaxation or rupture of the ligaments. Ambrose Paré applied the same doctrine to both kinds of displacement—"Causæ sunt quæcumque ligamenta vinculaque, quibus uterus continetur, exoluunt, relaxant, vel abrumpunt." (*Opera*, in *Uffenbachii Thesauro*, p. 255.) In the oldest medical periodical with which I am acquainted, it is said—"Prolapsus uteri quem invehit ruptio ligamentorum incurabilis est; periculosus qui relaxationem sequitur." (*Zodicacus Med. Gall.*, 1685; *Ann.* v., p. 66.)

[97] "Les ligamens larges et ronds ne sont pas cassés, comme le dit M. Puzos; ils sont seulement tiraillés, ce qui peut être une cause très-prompte de la mort de la femme, à raison de la distension considerable des nerfs, qui occasionne les convulsions les plus terribles. J'en ai plusieurs exemples qui ne peuvent être revoqués en doute." (Deleurye, *Traité des Accouchemens*, p. 441.)

[98] See my published case in the *Provincial Medical and Surgical Journal* for 1844, p. 156. On pulling downwards the tumour, so as to stretch the round ligaments, pain was always experienced at the groins. Tanchou, after experimenting, has asserted that the round ligaments are not stretched when the uterus is lowered, and Malgaigne confirms this statement; but experience goes against these remarks as applied to the inverted uterus. (*Malgaigne, Traité d'Anat. Chirurgicale et de Chir., Experimentale*, ii., p. 360.)

[99] The absence of pain in simple depression, as noted by Deleurye, Dailliez, and many subsequent authors, is to be accounted for not solely by the ligaments not being stretched, but by the inverted part suffering no compression, nor any constriction tending to strangulation; hence, there is neither pain nor nervous syncope,

be attributed to the sanguineous loss, it may be explained by the ligaments not suffering violence in this, the slightest degree of the displacement. What writers have asserted about the fatal effects of rupture of the uterine ligaments[100] is not founded on fact; the ligaments are rarely ruptured or torn through, and only in those cases where the organ itself is brought away with great violence, and even then, as we know, the event has not invariably been fatal. Sudden and considerable hæmorrhage will undoubtedly account for syncope. The sudden emptying of the abdomen and exposure of internal parts to the outward air, will tend to explain the same; but the most frequent cause of the great depression of the vital powers, the imperceptible pulse, and other signs of impending dissolution, is to be sought in the direct injury to the nerves and the shock thence arising to the whole system. It may be serviceable, therefore, to distinguish and denominate syncope, in reference to its cause, whether from loss of blood, (*syncope exsanguinea,*) or from depression of the vital powers through injury to the nervous system, (*syncope nervosa,*) and a correct appreciation of these will often suggest the principles of treatment.[101]

but only syncope from direct loss of blood. Perhaps, there is one exception to this, where *depressio* is forcibly induced by a very short funis, as will be noted in the next section, on the causes of inversion.

[100] Peu asserts that the inverted prolapse of the uterus cannot take place without rupture of the ligaments. (*Pratique des Accouchemens*, p. 585.) Pierre Amand supports the same view, adding that the result must be fatal, "les ligamens et les vaisseaux de ce viscere, dilacerez de toutes parts, n'en permettroient pas la réunion." (*Nouvelles Obs. des Accouchemens*, p. 215.) Hamilton wrote that extreme prolapse could not happen "without laceration of the ligaments connecting the uterus to the sides of the pelvis;" but, in a case where the inversion protruded nearly to a level with the knees, he succeeded in replacing the uterus in the vagina, still inverted, and the patient recovered and was living fourteen years afterwards. (*Duncan's Med. Commentaries*, xvi., 321.)

[101] In a case denominated spontaneous, from its having occurred without external interference, and where reduction was quickly effected, there was at the same moment pallor, cold sweats, rapid unsteady pulse, great prostration, seeming to threaten convulsions and death, and requiring brandy and laudanum, hot flannels, and frictions, for two hours, before the patient revived to a state of safety. "As there was no hæmorrhage, and as the re-inversion was effected in a few seconds, it is somewhat difficult in my mind to account for the sudden depression of the vital powers, amounting nearly to dissolution." (Radford, *Essays on Midwifery*, No. 5, p. 5.) One of my correspondents, Mr. Peskett, informs me of his having been called to two cases of inverted uterus, both fatal before he arrived. In neither was there more than slight

The possibility of the bowels, or omentum, when they enter the cul-de-sac of the inversion, becoming incarcerated, or even strangulated, cannot be denied; but the error[102] of ascribing the nervous symptoms, deliquium, and convulsions to this origin scarcely demands a confuting remark. The rarity of incarceration, or strangulation, of any portion of the abdominal viscera in the peritoneal cavity of the inversion, can no more be questioned than the possibility, and hence we may estimate the small degree of importance attached to this point in a practical view, although the decision of any question of fact can never be regarded as unimportant, where the truth, and the whole truth, is the object to be attained.

The next in importance amongst the complications and pathological conditions connected with the subject under consideration, is inflammation of the displaced organ and its appendages; and we may safely state that this morbid condition is not to be regarded as a necessary consequence, so long as the uterus is neither prolapsed, risking irritation from the external air, nor constricted, threatening congestion or strangulation. Inflammation is, indeed, most commonly the result of rude handling of the part through ignorance, error, or too free investigations for diagnosis or reduction. It is in *perversio,* therefore, that inflammation is most liable to arise, whether affecting the mucous covering, the internal substance, or the peritoneal surface of the inverted part, but it is remarkable how rarely does inflammation of the peritoneum ensue in even the most chronic stage of uterine inversion.

When the textures composing the inverted part become actively inflamed, it is accompanied by increased heat, excessive sensibility to the slightest touch, and increase of size; and it will be understood, on applying the established doctrines of our science, that ulceration of the surface of the tumour, or abscess within its texture, or adhesion to the opposed surfaces, whether mucous or serous, may ensue; but these last results are of rare occurrence,

hæmorrhage; in one the placenta was still completely attached to the uterus. He concludes by observing—"I could only account for death taking place so quickly from the shock the system received by the violence sustained."

[102] "Einschnürungen der herabgesunkenen Därme die Ursache von Ohnmachten und höchtsgefährlichen Convulsionen." (Meissner, *Dislocation. der Gebärm.*, iii., 14.)

notwithstanding so many authors have spoken of them most freely. Save the autopsies given by Lisfranc,[103] I have not found adhesion of the surfaces of the peritoneal cul-de-sac satisfactorily described, nor have I met with any instance of adhesion of opposed mucous surfaces amongst the numerous specimens of both recent and chronic inversion which I have had occasion to examine. Indeed, sloughing and gangrene seem to occur much more frequently, as the sequelæ of inflammation in *perversio*, than adhesion, abscess, or inflammation. Long ago it was well known to pathologists that the lining membrane of the uterus was particularly liable to sloughing, and the term *exfoliation* was applied to this morbid condition. When the uterus becomes inverted it is found to exhibit a tendency to the same destructive change, not in its mucous covering only, but through its entire substance, a tendency to be ascribed to several favourable conditions—the particular structure of the organ, the peculiar way in which its blood is supplied, the retrograde course of its vitality after delivery, its being, when inverted, an organ no longer capable of exercising any function,—each and all tending, under impeded circulation by constriction, to cause death and exfoliation of the part. Hence we have well authenticated instances, where all the inverted uterus[104] below the constricting cervix has been cast off, and the

[103] See Section viii., note 62. Denman, always cautious in admitting as facts what he had not seen, remarks,—"The inverted surfaces, though lying in contact, have not been found coalesced together, as has been surmised." (*Midwifery*, fifth edition, p. 540.) "Je ne connais pas d'observations dans lesquelles il y ait eu adhésion des parois de la matrice, obliteration de sa cavité; mais on a vu un état squirrheux, carcinomateux, succeder à l'inflammation tres-intense." (Ferrand-Demissols, *Thèse*, p. 32.) Moser names adhesions of mucous surfaces, as well as of peritoneal. (*Lehrbuch der Geschlechtskrankheiten des Weibes*, s. 201.) Siebold, Meissner, and others, support the same view. Windsor (*Med. Chir. Trans.* x., 358,) speaks of adhesion of the peritoneal surfaces, but not from his own observation. Where there has been much chronic irritation and induration, the opposed serous surfaces, if not the mucous, may adhere together; but it is rarely so; the peritoneal pouch has been found open after twenty years. (King, in *Glasgow Med. Journal*, i., 173.) Speculating too freely on adhesion taking place might be erroneously applied in practice.

[104] Rossetus, in 1572, met with a case which he has fully described:—"Uterum procidentem et inversum, ac putrefactum, citra artis auxilium, sua sponte ab ipsis usque radicibus totum excidere, muliere superstite." (Ὑστεροτομοτοκιας, *i. e. Cæsarei*, *Partus Assertio historiologica*, p. 353.) Primrose's case is much to the same effect, although very imperfectly related. The inverted uterus, remaining unreduced,

event followed by recovery, liberating the patient from her distressing and dangerous malady. But constriction is not the only way in which this destructive change may arise; the irritation and inflammation, aided by the predisposing conditions of the inverted organ, as just enumerated, may bring, and have often brought, on sloughing. Here the destructive process usually begins at the fundus or lowest part and extends upwards; and since the constitution of the patient in these cases is most frequently greatly weakened and impaired by long continuance of the malady in its chronic stage, the sloughing process has not led to a cure, but, on the contrary, to the extinction of the patient's life.[105] In total inversion, where there is no constricting cervix, and where still sloughing and gangrene are liable to take place, we must look to

gangrened in forty-eight hours, and was gradually cast off, the patient regaining health in a few months. (*London Med. and Phys. Journal*, vi., 332.) Dr. Radford supplies a valuable history. The inverted uterus could not be reduced, but by sanguineous, mucous, and purulent discharges, harrassed the patient for six months, producing great debility, diarrhœa, aphthous affections of the mouth, &c. During this time, Dr. Radford frequently examined and found the uterus gradually lessen, until it subsided to the size of a pear; the os always tightly girt the neck of the tumour. After a month's absence the patient returned in improved health, and suffering from a diminished, but still a purulent loss. Something had passed away, which the patient took for "a lump of blood." On examination, the inverted uterus was gone, the vagina terminating in a cul-de-sac. The patient lived several years afterwards, a cure having been effected by a complete separation of the inverted womb by ulcerative absorption, produced by the constricting cervix. (*Essays on Midwifery*, No. 5, p. 7; also *Dublin Journal of Med. and Chem. Science*, September and November, 1835.)

[105] Amongst fatal cases of sloughing uterus from recent inversion, I may quote or refer to the following:—"Post partum præcipitatum, fundus uteri per orificium uterinum protrudebatur. Fundi reducendi tentamen imperterrita et constans obstetrix quidem instituebat, totalem vero ejus repositionem perficere haud valebat. Aliquot elapsis horis accersitus, fundi uteri partem in collo et orificio uteri hærentum quasi incarceratum tangebam, quam tamen, ob dolores puerperæ graves ad singulum attactum, et stricturam orificii uterini magnam reponere non potui. Pars igitur remanebat prolapsa, quam orificium uterinum adeo stricte amplectebatur, ut ne digitum quidem minimum admitteret. Dein hæmorrhagiis sæpe recurrentibus et symptomatibus nervosis ad omnia remedia rebellibus infestata erat. Gangrena demum partem incarceratam corripiente, obiit." (Saxtorph, in *Actis Soc. Med. Hav.*, iii., 404.) At the expiration of four or five days, the inverted fundus was depending at the external labia, cold, purple, insensible, gangrenous. (Deboueir, in *Richter's Chir. Bibl.*, i., 117, *Stück* 3, from *Journal de Méd. Chir. et Pharm. par Roux*, xxxiii.) After two days, the prolapsed and inverted fundus was tumefied, being constricted by the cervix as in paraphymosis. (Mauriceau, *Mal. des Femmes*, ii., 558; *Obs.*, 685.) Fatal by strangulation in a few hours, by Delmas. (Velpeau, *Leçons Orales*, ii., 427.)

those conditions of the organ facilitating such morbid changes; and, moreover, when in total, or a less degree of inversion, there is prolapse, the constriction from the external labia may be sufficient to cause the separation of all the mass situated below. It has also been remarked that, whilst the inverted organ is in the vagina, it may suffer sufficient compression[106] to interrupt its vitality.

The singular case met with by Dr. J. Charles Cooke, now of London, when he resided at Coventry, (a case published a few years since without exciting due attention, and which has been overshadowed with doubts and disbelief, although no extraordinary case in pathology was ever more clearly established,) occurs to be noted fully in this part of my Essay, and, I hope I may add, illustrated through the liberality of the professors[107] who have custody of the unrivalled preparation obtained in this case, and through the talents of the artists employed. The following is a condensed account of the principal features of this case.

An Irishwoman[108] had a tedious labour, which terminated favourably on the evening of Friday, and, according to the midwife's report, without being attended by any unusual degree of hæmorrhage. All seemed to promise well during the next day. In the course of the second night, when the patient had just risen to evacuate urine, as she supposed, her screams suddenly roused an alarm, and a large substance, in size resembling a child's head and neck, escaped at the vulva and depended between the limbs, attended by profuse hæmorrhage. The midwife being re-summoned, found the woman lying upon the bed, pale from loss of blood and in considerable pain. The bed-clothes were saturated with blood, which had even flowed upon the floor. She next remarked the protruded substance lying on the bed, loosely connected with the vagina by a shred of membrane only. She removed the mass

[106] "Bei entzündlicher Anschwellung der Gebärmutter kann selbst die Scheide eine Inkarzeration der Gebärmutter bewirken." (Busch und Moser, *Handb. der Geburtskunde*, ii., 429.)

[107] The preparation is preserved in the museum of Queen's College, Birmingham, and, after a very careful inspection of it, I can vouch for the accuracy of the excellent drawing made by Mr. S. Moreton, the Curator of the museum.

[108] *Case of Loss of the Uterus and its Appendages soon after Delivery, with Remarks on the Propriety of Removing that Organ in Cases of Inversion or Scirrhus*, by J. C. Cooke, Coventry, 1836. Also, the *Med. and Surg. Journal*, by Ryan, for March 26, 1836.

without difficulty or effort, and placed it in a wooden bowl. This separation was effected thirty-six hours after delivery. In half an hour the hæmorrhage ceased, and the midwife left the patient, carrying with her the contents of the bowl, which after a few hours she submitted to medical inspection, and to the astonisment of all it was discovered to be the entire uterus inverted. The patient soon rallied from the exhaustion, and experienced only slight febrile symptoms, regaining gradually her health and strength, so as to resume in a short time her usual avocations. There was no lochial discharge, and although the breasts became distended with milk, this secretion was entirely and permanently suppressed within two days from the separation of the uterus. The patient was living and in good health three years afterwards. Upon inspection of the separated mass, there was no laceration visible except a slight rent in the posterior lip of the os uteri. The spot to which the placenta had been attached was distinctly marked by being of a deeper brown red than the remainder of the surface of the tumour, and also by the adherence of some flocculent portions. It was inserted over, and concealed the opening of the left Fallopian tube, the orifice of which was easily discovered. The vessels were large and tortuous. On a section being made so as to open the peritoneal pouch of the inversion on its anterior aspect, all the ligaments, with both Fallopian tubes and the right ovary, were discovered occupying this pouch, the left ovary being the only part of the uterine appendages remaining in the abdomen of the patient. The fimbriated extremities of the tubes were particularly clear and distinct.[109]

The early history of this case, resting solely on the testimony of the midwife, must ever remain inconclusive on some important points,—as respects the date of the inversion, the causes thereof, and the means by which the separation was effected,—but no fact in pathology has ever been more satisfactorily established than that the entire uterus inverted and prolapsed, was readily separated by the midwife from the body of the patient about thirty-six hours after delivery.[110]

[109] See plate 11, and description.

[110] Dr. J. C. Cooke has added some judicious remarks, which would deserve to be more extensively copied than I can allow myself to offer them in a note. After the mass had been removed, the only part of the abdomen found to be tender on pressure was towards the left side, the same on which the ovary remained. The

I wish further to direct the reader's attention to another remarkable case already published,[111] but which I apprehend may not have been fully understood or appreciated by all who have perused the account. It suggests to me that, without either strangulation or inflammation, the inverted uterus may slough or sphacelate by direct loss of vital power, a circumstance which I omitted to state in its proper place.

A primiparous woman, aged thirty-seven, of feeble frame and pulse, was taken ill on the fifteenth of December, 1839, and arrived at the *fifth* day of a very lingering labour before the child's head entered the pelvis. Six half-drachm doses of ergot were administered in the course of two days. Delivery by the forceps was proposed by the surgeon in attendance, but not assented to; and on the evening of the *sixth* day, the child's head passed the *os externum* without the exhausted patient being conscious of it. Mr. E. Crisp, who is well known to the profession, arrived just at this stage, and was occupied for half an hour in delivering a putrid fœtus; and as contraction of the uterus could not be induced, he passed in his hand and peeled off the placenta, which was also putrid and offensive. Still the uterus did not contract, and yet there was no hæmorrhage. Mr. Crisp assures me that to his hand the internal surface of the uterus felt below the usual temperature, even cold, as if almost deprived of vitality, and there were no expulsive pains. A cold perspiration bedewed the surface of the body, and the pulse was scarcely perceptible; the patient, however, slept, and by appropriate stimulus and nutriment she rallied after a time. There appeared no lochial discharge. Two days

midwife asserted that she did no more than remove the tumour, which she found prolapsed between the lower limbs of the patient, attached to the vagina by a small piece of membrane only; and that no force was used at this precise time was attested by others present. There is no account of the ordinary symptoms of inversion having been present after the delivery. That none of the abdominal viscera prolapsed after the separation of the uterus seems remarkable, but supports the evidence given by the females in the room, that, until about the time the inverted uterus prolapsed, there was no marked bearing down or forcing pains. For nine days before labour there had been constipation, which continued until the inverted organ was separated by the midwife. Obscurity and defects in the history of this unique case in other respects cannot alter nor render doubtful the fact of the inverted womb having been easily detached by the midwife, and presented precisely the appearances depicted in plate 11.

[111] "Mortification and entire separation of the Uterus after a lingering Labour, with Recovery of the Patient," by J. T. Darvill, in the *Lancet* for April 8, 1843, p. 51.

after delivery, as the recorded history informs us, *the uterus was about half contracted,* the abdomen slightly tender and tympanitic, and in the right iliac region a degree of swelling was observed, crepitant to the feel, like air in the subcutaneous cellular tissue. Leeches and poultices, with calomel and opium internally, formed the treatment; the body became less tender, although the pulse was still 120 in a minute. On the third of January, no vaginal examination having been made since the delivery, a fœtid discharge commenced, and injections of chloride of lime were substituted for tepid water. Next day a mortified substance, about three inches in length, protruded at the vulva, having a spongy feel. Gentle traction was tried, but the substance was not moveable. In three days more, a substance a foot and a half in length came away, and after this the patient felt more easy, but the urine passed per vaginam. Chloride injections were continued; for two or three days small sloughy portions, with pus, were discharged. After this time health was gradually restored, so that the patient was quite recovered in a few weeks, suffering only from incontinence of urine. When subsequently examined, the vagina was found to terminate in a cul-de-sac, between two and three inches in length, and nothing like the uterus was to be felt; the vagino-vesical partition had disappeared, leaving so large an opening into the bladder that its mucous lining, inverted, appeared at the external labia.[112]

The sloughing mass thus spontaneously ejected, *per vaginam,* having been reclaimed, after being (as seems usual on these singular occasions,) thrown away into the privy, was exhibited at the Medico-Chirurgical Society of London; it was of a very irregular shape, about a foot and a-half in length, and half a foot in breadth, and at one point there was a distinct fibrous tumour. Several learned professors present considered it to be, unquestionably, uterine structure. Mr. Crisp still preserves this mass, as one of the rarities in his private collection, and some time since he favoured me with the use of it for minute inspection. During the time it remained in my possession I had a drawing made of a portion of it, which will exhibit sufficient evidence as to its nature.[113] The

[112] I have learned from Mr. E. Crisp that this patient was living, and in good health, nearly four years afterwards; there had been no menstrual appearance since her singular delivery and recovery.

[113] See plate 12, and description.

cellular appearance, resulting from the many large sinuses that traverse it, are sufficiently characteristic of the uterine structure. The half-putrid state of the mass, before it was preserved, has destroyed all distinction as to ligaments, Fallopian tubes, or ovaria; but the peritoneal is distinguishable from the mucous or internal covering of the uterus, and immediately under the latter is observable a distinct fibrous tumour, about the size of a walnut, which can be readily enucleated from the adjoining structures. The explanation which I beg to offer of this singular case is the following:—There was great languor in the patient's constitution from the outset, and the uterus, in the course of six days of lingering labour, nearly lost its vital powers; whether the use of ergot contributed in any degree towards this state, we may suspect, but cannot determine; the cold and bloodless state of the organ at delivery, so unequivocally remarked upon by Mr. Crisp, showed that scarcely any vitality remained; and if we admit that, after the placental delivery, the uterus was *in situ*, it could not long remain so; being collapsed and almost lifeless, without any contractile power, it would yield to the expulsive abdominal efforts which the patient was still just able to make, and would become inverted and collapsed, and in this state lodge in the vagina. When it is said that the uterus, after two days, *was about half contracted*, was it not introverted, accounting for its subsidence? As it descended, it filled and distended the vagina, as may be inferred from the patient feeling more easy when the sloughing parts came away. If the uterus, deprived of its vitality, had remained in contact with the abdominal viscera, and *in situ*, a fatal issue would have been unavoidable; but, supposing the organ to be introverted, and driven down, collapsed, into the vagina, all the difficulty is solved; the dead mass, compressed in the vagina, finds an outlet, and thus we have an instance in which uterine inversion, usually so serious and dangerous, became the means of saving life, by affording the only safe process for the mortified organ being ejected from the living system! These great resources of nature on desperate occasions, should teach us never to desert patients in extreme and unusual states of disease, however threatening and appalling!

If I have forsaken order in the preceding pages, by intermixing the pathology of recent and chronic inversion, I will now redeem my position by referring to the latter, which, after months or years,

and particularly where prolapse takes place, may undergo changes from long continued irritation, or slow inflammatory action, until, by infiltration, the textures become greatly thickened, the organ much enlarged, destroying all resemblance in size, and, perhaps, even in shape, to the accounts I have given. Such enlargement is, most usually, simple induration; and the organ may be compared to a large substance, a gourd, or a cocoa-nut, and bear little resemblance to the uterus in chronic inversion as restricted within my own observation. Schmucker[114] has consecrated a few pages to one of the most interesting of these histories; but in general the accounts of this kind, particularly from the older authorities, are too vaguely given to be relied upon; polypi and prolapsed uterus, without inversion, are confounded with supposed inversion of the uterus, all distinction of separate textures is absent, and it would be to perpetuate error, or at least obscurity, to go further in this direction. I find no reason to believe that malignant ulcer frequently[115] attacks the inverted uterus, but rather that this morbid action, so peculiarly liable to attack the os and cervix, when normally placed, is unlikely to occur under inversion, where the os and cervix are protected by retirement, leaving the fundus exposed to various sources of irritation; and the fundus, from its different structure, is undoubtedly less disposed to cancerous induration and ulcer, as distinguished from induration that is mild and not cancerous.

It would lengthen this section too much to enter at large into the pathological effects of uterine inversion, caused by or complicated with polypus. This latter disease has been so ably treated of by the best pathologists, that it could only be required to notice what peculiarities are added, when inversion of the womb ensues

[114] In this case the uterus, inverted at delivery, remained five years in the vagina, increasing in size by chronic irritation and inflammation, until neither urine nor fæces could be voided but with the greatest difficulty. Some relief was gained by the use of *lavements* and the catheter, also by a bandage to support; but one night, the bandage being removed and certain efforts for defæcation made, the tumour, as big as a child's head, prolapsed externally, foul and scirrhous, the cervix encircling its highest part. It could not be even replaced in the vagina. The state of health forbad any operation. Gangrene supervened, and in a short time, death. (Hoin, in *Schmucker's Vermischte Chir. Schrift.*, ii., 143.)

[115] Newnham, in his Essay, p. 10, says, in reference to chronic inversion, "The uterus is more liable to take on diseased actions, and consequently we find it frequently becomes scirrhous, or is attended by gangrenous or malignant ulcerations."

from polypus. These peculiarities are few, and consist chiefly in the aggravation of symptoms, particularly of hæmorrhage, and the increase of danger. Already some examples illustrative of this subject have been set forth,[116] and many more interesting histories might be adduced.[117] The double source of hæmorrhage would afford matter for discussion;[118] but with a mind unequal to the arduous task of handling so extensive a subject in the allowed time, I will desist, lest the reader should be induced to remark that "Naturam non *revelare* sed *obvelare* studebat."

SECTION X.

ON THE CAUSES AND MECHANISM OF INVERSION OF THE WOMB.

An accurate knowledge of the causes of any particular disease supplies the certain and correct clue to its prevention and treatment. Even in the imperfect and rapid review which I may be able now to submit, the contradiction and insufficiency of the diverse causes assigned will be too apparent; failing, however, in the more desirable objects, it will still serve to exhibit how much attention and ingenuity have been exercised upon this rare, and for the most part, unthought-of subject.

There are certain conditions which are deemed essential to the effecting of uterine inversion. The organ cannot suffer this displacement in its normal unimpregnated state,[119] but must

[116] See Section IV. of Part I., *passim*.

[117] In a woman, aged seventy years, a polypus weighing four pounds was expelled. The uterus inverted—fatal. (Dailliez, *Thèse*, p. 30.) Uterine inversion from polypus—death from peritonitis—autopsy. (Velpeau, *Med. Op.*, iv., 383.) A similar case, with minute account of the pathological condition as found on dissection. (Cruveilhier, *Anat. Pathol.*, ii., livr. 11., pl. 6.)

[118] Confer, Lisfranc, *Clin. Chir.*, iii., 99.

[119] Nothing is more clear than that the healthy undistended uterus cannot be inverted. An unexplained and puzzling case or two cannot upset this remark. If inversion has ever occurred without previous enlargement of the uterine cavity, there must have been some spontaneous disease to relax and alter the walls of the uterus. (See Part I. of this Essay, notes 129 and 132.) Boivin and Dugès suggest that, in Boyer's case, the displacement might have originated at delivery, and advanced slowly. (*Dis. of Uterus*, by Heming, p. 116.) Vidal de Cassis remarks upon the same subject, "il faut supposer un ramollissement spontané de la matrice qui puisse

undergo an enlargement of its cavity, and a thinning, softening, or relaxation of its walls, as well as dilatation of os and cervix. The different means, not all of them morbific,[120] by which such changes are effected, have been enumerated in the first part of this Essay. The most frequent amongst them is pregnancy, to which the following remarks may be regarded, if not exclusively, at least more particularly, applicable, unless otherwise specified.

It will be convenient to consider the causes of inversion of the womb as predisposing or efficient.

The predisposing causes, denominated also remote or accidental, are such as put the organ concerned in a condition to be inverted. They may exist long before the occurrence, but some one or more of them, including the essential conditions first enumerated, must be present at the time the displacement occurs. Whatever tends to relax and enfeeble the system might be enumerated amongst the predisposing causes; for a great majority of instances of this displacement have occurred in women of delicate frame, of very relaxed fibre, and with yielding soft parts about the pelvic cavity, such as usually conduce to an easy, quick, precipitous delivery. Where the pelvis is large and with little obliquity or curve in the line of its axis, there is a great tendency to inversion of the womb at delivery, as well as to direct descent or prolapse; and if, in such a formation, and with relaxed soft parts, inversion begins, its further progress is greatly facilitated, and the disease rapidly progresses to the greatest degree. The erect posture adds to the tendency towards this displacement, and in those countries where delivery in the sitting posture is sanctioned, all other circumstances being supposed equal, there will assuredly occur a greater proportion of cases of inversion than where recumbency, as enjoined in this country, is adopted. Many of the recorded instances of inversion have happened to patients rapidly and spontaneously delivered whilst erect, and before they had sufficient warning to assume a recumbent posture.

le permettre; ce qui est impossible quand le tissue de cet organe est à l'état normal, à l'état de repos complet." (*Méd. Op.*, v., 784.) Lisfranc explains such cases by observing, "il me semble qu'on s'agit d'inversions qui ont été d'abord méconnues." (*Clin. Chir.*, iii., 383.)

[120] It has been stated that uterine inversion is always secondary, the sequel of some other disease, thus making *pregnancy* a disease. (Lefaucheux, *Diss. sur les Tumeurs, &c.*, p. 47.)

The condition of the uterine organ may be next referred to, as affording ample scope for detailing many of the most powerful predisposing causes. Pregnancy is the only natural source of such a distension of the uterus as fits it to be inverted; and the full term of utero-gestation is undoubtedly the most favourable period for the inverted displacement being effected. It may, however, occur not only at any period approximating to the full term, but so early as at an abortion of three months, as already stated;[121] and more recent experience has shown that the uterus, at this early period of its natural enlargement, if inverted on the premature expulsion of its contents, may be successfully replaced.[122] It has been usual to regard the over-distension of the uterus by an abundance of the *liquor amnii* as disposing to inversion, but the details which I have obtained, and fully scrutinized, do not support this opinion. The liability to inversion of the uterus does not seem to be in direct proportion to the degree of its distension. In the first place, pregnancy with twins has not led to a greater proportion of cases of inversion than single births, taking into account the relative frequency of each. Out of four hundred cases of uterine inversion there occur only four examples of twin

[121] See the conclusion of Section II. of Part I., of this Essay.

[122] Dr. E. Skae, of Leven, Fife, on a personal interview, told me of a case, which, at my suggestion, he subsequently made public, exhibiting the following most interesting particulars. He was called to a labourer's wife, thirty-six years of age, in a miscarriage, and found her in a state of great distress and exhaustion, with intense pains in the back, iliac regions, and lower limbs anteriorly, even to the ankles. Pulse 120 to 130; clammy moisture of skin. Flooding had commenced ten days before, after fatigue from over-exertion, and abortion followed in the next day, at four months of gestation. After three days she got up, and attended to some household affairs, but the flooding increased, compelling her to return to her bed, and about the ninth day, under a fit of vomiting, she felt something falling down within her, which sensation continued, accompanied with bearing-down pain, flooding, much general uneasiness, and extreme prostration of strength. In this condition Dr. E. Skae found the patient, and on a digital examination he ascertained that the vagina was "nearly filled with an elongated and somewhat irregular tumour, of pretty firm consistence, and having shreds of membrane attached to it." A deeper investigation discovered the os uteri, two inches in diameter, and in a dilatable condition, and "the neck of the tumour entering within it, and having an equally firm attachment around the whole circumference of its inner margin." Satisfied that the mass in the vagina was the uterus "in a state of almost complete inversion," he grasped it, and made steady and continued compression in the direction of the os uteri, manipulating with the fingers as occasion required, and in the course of fifteen or twenty minutes he succeeded in returning the whole mass within the os.

deliveries;[123] at least, I have found no more than four instances of plural births noticed and specified, and had more than one child been born in each of the remaining *three hundred and ninety-six* cases, it is a circumstance that would most assuredly have been stated. Next, there is a vast preponderance of primiparous patients amongst the sufferers from this displacement. Of above one hundred instances in which the number of the pregnancy is specified, a majority are first cases.[124] Now in a first pregnancy, it is well known that the uterus is distended with less *liquor amnii* than in subsequent ones, consequently there is something disposing

So much pain and resistance was experienced in endeavouring to push the fundus up to its normal position, that Dr. Skae desisted, contenting himself with having returned the whole organ within the os tincæ. Immediate and great relief was gained, and the hæmorrhage ceased. Next morning the fundus uteri was felt projecting a little beyond the os tincæ, which had contracted considerably; yet, with little difficulty, and trifling pain to the patient, Dr. E. Skae was able "to push it up to its relative position within the pelvis." Recovery was slow, but perfect health was regained, and regular menstruation returned. (*The Northern Journal of Medicine* for July, 1845.)

[123] The four cases alluded to occur as follows:—Saucerotte, *Mélanges de Chirurgie*, p. 397; Meissner, *Dislocationen der Gebärmutter*, Th. 3, s. 27; Martin-le-jeune, *Mém. de Méd. et de Chir.*, p. 202; Square, *Provincial Medical and Surgical Journal* for July 1844, p. 250. I observe that Sue-le-jeune, (*Essais historiques, littéraires et critiques sur l'Art des Accouchemens*, ii., 404,) refers to prolapse of an inverted uterus twenty-eight months after delivery of twins, (from *Mem. de l'Acad. des Sciences*, i., 60, A.D. 1759,) but this is not included in my calculation: it would bring the proportion of twin-births followed by inversion to *one* in *eighty*, which corresponds near enough with what occurs in births generally. My former pupil, Mr. Copeman, having added 1037 cases of delivery noted in his own private practice, to 1377 of a like list kept by myself during many years, found the proportion of twin-births to single-births to be 26 out of 2414, or as 1 to 92; but my list showed a proportion of 1 in 81, and Mr. Copeman's 1 in 115.

[124] This calculation refers to a small number, on account of the frequency being rarely noticed numerically. The precise number in which such a notice occurs, in my statistical list of cases of uterine inversion, is 113; of these, 59 were first pregnancies, leaving 54 for all others; of these 54, as many as 14 were second deliveries, 8 were third, 9 were fourth, 9 were fifth, 7 sixth, 2 seventh, and the remaining 5 were from eighth to fifteenth. Of the 1377 cases of midwifery, referred to in the preceding note, (123,) and occurring in my own practice, (they were exclusive of all consultation-cases,) the first labours were 356, and all the rest 1021, just 249 being second, 189 third, 155 fourth, 122 fifth, 83 sixth, 68 seventh, 48 eighth, 35 ninth, 27 tenth, 19 eleventh, 13 twelfth, 6 thirteenth, and the remaining 7 from fourteenth to seventeenth pregnancies. It will be easy to test the validity of the arguments I use, both as to the influence of plural births and of first labours, in disposing to inversion of the womb, by referring to more extensive statistical documents, and thus to strengthen or subvert my conclusions.

to inversion of the womb in primiparous patients that does not relate to the size to which the uterus is dilated by its contents. A consideration of the age of the parturient supports the same view, and brings us to the same conclusion. After repeated pregnancies, and in advanced years, the uterine cavity is more dilated in pregnancy, yet the young are most liable to suffer uterine inversion.[125]

The condition of the uterine walls is not to be passed unnoticed; it varies much in different patients, as ascertained on examination by every practised accoucheur, who is aware that rupture of this singularly endowed organ may be the result of unusual thinness of its walls, as well as of their delicacy and tenuity of texture. The same remarks will serve us in estimating the liability to inversion of the womb by the state of its walls. I have particularly referred to a fatal case,[126] where the parietes of the uterus were not above half the usual thickness. There is, moreover, as much difference met with in the uterine texture as in the measured thickness of its walls; and to these differences we must look for an explanation of some of the very worst cases of the fatal malady under consideration. But it is rather the vital action than the mechanical properties of the uterus that must be taken into account in estimating the predisposing causes depending upon its condition. Partial inertia,[127] or a want of contraction and of

[125] My tables furnish just 100 instances of inversion of the womb *post partum*, in which the age is specified, and 70 out of the 100 were under thirty years of age at the time of the occurrence.

[126] See Section VIII., for Professor Berry's case,

[127] Only a few of the authorities on this subject can be quoted. Deleurye places first on this list:—"L'atonie de la matrice, surtout après une grossesse volumineuse." (*Des Accouchemens*, p. 442.) Dailliez, after enumerating the essential preliminaries for inversion, adds, "Il faut encore que les propriétés vitales de l'organe soient plus ou moins affaiblies. (*Thèse*, p. 37.) Le Roux, remarking upon inertia as concerned with hæmorrhage, and also depressio, adds, "Elle n'occupe qu'une partie de l'utérus, et cette partie est toujours le lieu ou s'attache le placenta." (*Sur les Pertes*, p. 60.) And, again,—"C'est effectivement celui qui se renverse toujours." (*Ibid.*, p. 72.) "Tous les auteurs qui ont observé le renversement de la matrice, se sont aperçus que la portion deprimée était souvent sans ressort; la placenta y était presque toujours adhérent, par conséquent elle s'était très-peu resserrée." (*Ibid.*, p. 70.) Gardien follows Dailliez' remarks, putting them in still clearer language. "Cette molesse qui expose les femmes aux hæmorrhagies adynamiques à la suite des couches, dispose ce viscère à se renverser." (*Des Accouchemens*, iii., 346.) So Murat, as to atony of the uterine walls. (*Dict. Sc. Med.*, xlvii., 465.) Desormeaux, having spoken of efficient causes, both by propulsion and traction, continues—"L'action de

due living action in a part of the uterus, has been regarded by nearly all the great authorities, from the time of Deleurye's admirable *Theses,* (the foundation on which all subsequent systematic treatises appear to have been constructed,) as the most powerfully disposing condition to the commencement of inversion, (*depressio,*) and without which the greater degrees cannot transpire. After carefully weighing the subject, I feel unable to come to any other conclusion, than that this state of inertia ought in general to be regarded as the necessary condition for the first step in the displacement, *depressio,* being produced. The stage of the delivery in which inversion commences, is constantly that of the removal of the uterine contents, or the principal part of them; and all general accounts of its causation must have reference to that stage. All the wise precautions which experienced men have enjoined for the prevention of inversion *post partum,* relate to the avoidance of collapse, total or partial, of the uterus, and not to the dread of its contracting too fully or too rapidly. This is not the discussing of a vague and unimportant theory, but the deciding of a question which has direct influence upon the means of prevention, and, perhaps, scarcely less influence upon the right mode of treatment. Much has been attributed to irregular action

ces causes n'est jamais plus efficace que lorsque l'utérus est dans un état d'inertie, car alors les parois de cet organe, toutes dilatées et flasques, n'opposent aucune résistance; cet état doit donc être regardé comme la principale cause prédisposante du renversement." (*Dict. de Méd.*, xviii., 266.) Moreau observes, that amongst predisposing causes, "Nous rangions toutes celles qui peuvent amener le relâchement, l'amincissement et l'atonie des parois uterines." (*Des Accouchemens*, i., 247.) A. E. de St. Amand says of partial inertia, "C'est le plus fâcheux accident qui puisse arriver à une femme ..... tantôt, et c'est le cas le plus ordinaire, le fond de la matrice est le seul qui ne jouisse plus actuellement de cet faculté contractile." (*Diss. sur les Pertes de Sang, &c.*, p 59.) Toutes les circonstances capables de produire l' inertie de la matrice sont des causes prédisposantes de la maladie." (Lisfranc, *Clin. Chir.*, iii., 376.) Dugès gives the following explanation:—"An irregular partial contraction, that for instance which occasions the *encystement* of the placenta, may circumscribe a flaccid portion aud force it inward, instead of strangulating it outwards. We have seen the fundus uteri, during hæmorrhage from inertia of the organ after labour, sink into its cavity in the form of a cup. When the inertia ceased, the depression spontaneously disappeared; but the fundus was again found depressed *post mortem*, the patient having survived the weakness occasioned by the hæmorrhage only one day. (Boivin and Dugès, *Dis. of the Uterus*, by Hemming, p. 117; foot-note by Dugès.) Velpeau espouses tbe opinion that there must be a sort of atony of the part of the uterus which becomes inverted. (*Leçons Orales*, ii., 411.)

of the uterus. I know not what is meant by this irregular action, except it be that some parts of the organ are contracted, whilst others are in a state of collapse or inertia. Those who enumerate inertia as one of the most powerful predisposing causes, espouse the opinion that the portion of the uterine walls which is thus circumstanced, is the seat of the commencement of the inversion. Of the many writers who distinguish correctly the different stages of this displacement, there is scarcely one hardy enough to assert, that the commencement of the process is in the spot actively contracted.[128]

The relaxed state of the ligaments of the uterus, so much dwelt upon as leading to uterine descent or prolapse, has also been placed amongst the predisposing causes of inversion;[129] and when we consider the state of the round ligaments in advanced pregnancy, their increased length, and their ascending direction, we shall not fail to regard them as incapable of affording any resistance, and therefore passive, as regards inversion, until they have had time to contract and resume their more active condition.

[128] To show both sides of the question I must quote that, amongst the predisposing causes has been mentioned, "*a preponderating contraction of the fundus* whilst the rest of the uterus is relaxed, in which case the fundus may descend into the body of the uterus:" but can it be contracted at the time it thus descends and changes shape? (See Moser's *Lehrbuch der Geschlechtskrankheiten des Weibes*, 1843, s. 194.)

[129] Already the injury to the ligaments, arising from the displacement, has been noticed. (See Sect. IX., notes 96, 97, 98.) The attention is here directed to a different subject—any abnormal condition that may facilitate inversion. The earliest notion about direct prolapse of the uterus was, that it depended on relaxed or ruptured ligaments, and subsequently the same become applied to inversion. Most authors on this latter subject acknowledge laxity of the uterine ligaments as a predisposing cause; still Richter, long ago, in reviewing Levret, enunciated the sounder doctrine, that the laxity and elongation of the ligaments, as found in autopsical dissections, is not the cause, but the consequence of the displacement; the pain, stretching, and dragging downwards, experienced by the patient, are referred to as proofs. (*Chir. Bibl.*, iii., 210, and *Journal de Méd.*, xl.) Tanchou's experiments (see *Revue Méd.*, 1837, and *Omodei Annali Universali di Medicina*, lxxxi., 229,) which led him to consider that the cellular tissue of the vagina supports the uterus *in situ*, and not the round and broad ligaments, although sustained by Malgaigne, (*Traité d'Anat. Chir. et de Chir. Experimentale*, ii., 360,) cannot be considered as supported by what occurs in inversion and descent of the womb; it is in vain to assert that the round ligaments are not stretched and tense under this displacement; not even Madame Boivin's utero-sacral ligaments, whatever support they afford to the cervix uteri, can interfere with the facts ascertained by practical experience, which must be considered as strong as those derived from experiments, these being consequent, most usually, upon preconceived notions.

Since inversion cannot commence until the contents of the uterus escape, partially or entirely, the dilatation of the os and cervix must be an essential preliminary, and the more it is relaxed and dilated[130] the more will it facilitate the displacement, by hastening the escape of the uterine contents. The effect of a previous inversion in disposing to the same malady at a subsequent delivery seems not to be considerable; indeed, I have found only a very small proportion of cases, in which the accident has occurred on a second occasion;[131] and in some of these a healthy, uncomplicated delivery has intervened. The placenta must be at the fundus to make the circumstances parallel, which will rarely happen in consecutive labours, and without it the same constitutional state will scarcely be sufficient, even under equal mismanagement by the accoucheur.

Hæmorrhage has been classed with the causes of inversion.[132] As it commonly depends upon partial inertia of the uterus, it can be a predisposing cause only by increasing that inertia; but if the blood accumulate in the uterine cavity in the coagulated state, its sudden escape may be attended by inversion.

The attachment of the placenta to some part of the internal surface of the *fundus uteri*[133] is found to be so general in cases of

[130] I cannot omit the remark of an author of high authority, that he met with inversion consequent on laceration of the os uteri in a difficult labour:—"Vidi un rovesciamento d'utero fattosi in grazia d'essersi lacerato l'orificio nell'eseguire il parto forzato." (Monteggia, *Istituzione Chirurgiche*, viii., 171.)

[131] The case published by me (*Provincial Medical and Surgical Journal*, 1844, p. 154,) shows inversion in the first, and again at the second delivery. Another instance of the same has been communicated to me by Mr. Sparke. The first and fourth deliveries were followed by inversion in a patient of Mr. Henry Wilkin. A recurrence of the displacement after an interval of two years, (Löffler, in *Hufeland's Journal der pract. Arzneikunde*, vii., 45, st. 4,) and of six years, (Ané, in Dailliez, *Thèse, Obs.* 1 and 2, from *Recueil période. de la Soc. de Méd. An.*, 1797,) are the only other examples I am able to refer to, and they are scarcely sufficient to support the remark of Lisfranc, that "Une inversion anterieure, quoique combattue victorieusement dans son principe, expose à une inversion nouvelle." (*Clin. Chir.*, iii., 376.) It is not, however, very clear whether this sentence be intended to apply to a relapse *after reduction*, or to a *future delivery*.

[132] Both Sabatier and Le Blanc thought that hæmorrhage was a direct cause of inversion; the limit of its influence seems to be correctly pointed out by Ménard:—"Les pertes considérables peuvent aussi produire cet accident, parce qu'elles contribuent à relâcher l'utérus." (*Thèse*, p. 7.)

[133] Velpeau examined *thirty-four* bodies of females, who died either during pregnancy or very soon after delivery, and found the centre of the placenta to answer in

inversion, that it may be regarded as almost essential to its production. It undoubtedly ranks amongst the most powerful predisposing causes, and forms so close a connecting link between those and the determining causes, that much of what needs to be remarked about it will come under the latter category. All that requires now to be said is, that neither the situation of the placenta at the fundus, nor any other of the predisposing causes enumerated, although treated of separately, have much effect, unless several are conjoined.

We are thus brought to the efficient, called also the immediate, direct, or determining causes, which, indeed, are the only real and active causes of the displacement under consideration. All the predisposing causes and conditions leave the uterus quiescent, until the efficient causes determine an inversion. The more numerous and strong the predisposing causes,[134] the less powerful are the efficient required to be for producing inversion, and the converse. However strongly predisposed the patient may be by the state of her constitution, or of the uterus and its neighbouring parts, there must be a power either to push or to draw down a part of the uterus,[135] for commencing an inversion of its walls.

The efficient causes may be advantageously classed under three heads,—first, such as are situated in the uterine tissue itself; secondly, such as act upon the outer surface of the organ, pressing

twenty instances "à l'orifice de l'une des trompes; *thrice*, en avant; *twice*, en arrière; *thrice*, au dessous; and only *six times* vers le fond de l'utérus." (*Traité d'Accouchemens*, i., 298.)

[134] In a very relaxed patient, the pelvis large, the placenta at the fundus, and the delivery effected in the erect posture and with a single pain; here the predisposing causes are so strong, that the efficient need act only moderately to give rise to the displacement. The patient robust, and of strong fibre, the pelvis and soft appendages firm, great efforts, both uterine and abdominal, are required to expel the fœtus; although the placenta be at the fundus, nothing short of rash traction by the cord, and powerful abdominal efforts of the patient thus induced whilst the uterus is quiescent, can cause inversion; the predisposition depends solely on the situation of the placenta and the absence of all uterine nisus, and the efficient causes must be energetically applied or there will be no risk of the displacement. See Weissenborn (*Von der Umkehrung der Gebärmutter, durch zwei merkwürdige Falle erläutert*, s. 12–14,) for contrast; one a delicate, sensitive female, the other a stout, robust, hard-living, soldier's wife.

[135] "Necessum est ut quædam ex causis internis vel externis simul concurrunt: uterus enim, licet atonus, non invertitur, nisi adsit quoddam momentum determinans inversionem." (Deleurye, *Theses*, p. 9.)

or driving it down; thirdly, such as act on its internal surface, drawing or pulling it down.

The action of the uterus in increasing an inversion, when once this has commenced, has been admitted and indicated by very many authorities, but by none more pointedly than by our countryman, Dr. Denman,[136] who observes that "if a disposition to an inversion be first given by the force used in pulling by the funis, it may be completed by the action of the uterus." This distinction between the commencement of inversion and its further progress requires to be kept constantly in mind in considering what share the uterus itself has in contributing actively towards the displacement. I cannot conceive that the organ itself has any power to *commence the displacement,* and to cause simple *depressio;* and there is scarcely any writer, who has entered minutely into the mechanism of inversion, who attributes to the uterus such a power. But when a commencement has been made, and the case goes on to *introversio,* bringing the fundus within the grasp and influence of the uninverted body of the uterus, this organ will, by the natural powers called into action by its sensibility, regard the

[136] *Practice of Midwifery,* fifth edition, p. 541. Astruc, after observing that inversion is frequently caused by the midwife pulling at the cord, adds "Ou ce qui est plus ordinaire, des contractions convulsives, qui agite la matrice dans certains accouchemens laborieux, et qui en pousse le fond hors de l'orifice où il s'engage, comme l'on sçait que dans les coliques violentes il arrive souvent, que les intestins s'engagent l'un dans l'autre." (*Mal. des Femmes,* iv., 21.) Desormeaux falls in with Astruc's notion of intussusceptio intestinalis:—"Il est des cas où il faut bien admettre qu'il se passe quelque chose d'analogue." (*Dict. de Méd.,* xviii., 266.) The same writer makes a clear distinction between the commencement and after-progress of inversion:—"Pour expliquer l'accroissement successif du renversement, il faut admettre que la cause qui a commencé le déplacement continue à agir, ou que les parois de la matrice sont le siège de ces contractions spasmodiques irregulières, &c." (*Ibid,* 270.) Le Roux doubted the possibility of inversion of the womb being produced "par l'action propre de ce viscère, quand il arrive, il y a lieu de présumer qu'il depend de causes étrangères, et que la matrice n'y contribue que par le peu de resistance que sa faiblesse leur oppose dans certaines circonstances." (*Sur les Pertes,* p. 64.) Dailliez, after explaining the spontaneous replacement of *depressio* and *introversio,* assigns to the uterus itself the power only to increase *perversio*:—"Lorsque la portion la plus volumineuse du corps de la matrice s'est avancée dans le vagin à travers l'orifice, les forces contractiles de ce qui n'est pas renversé répoussent dans *les deux premiers cas* ce qui est renversé et achève de renverser tout ce qui ne l'est pas dans *le troisième,* par un mécanisme aussi aisé à concevoir." (*Thèse,* p. 27.) Gardien copies these ideas, varying the language. (*Des Accouchemens,* iii., 337.) See note 127, near its conclusion, for Boivin and Dugès.

inverted part as an extraneous mass, and proceed to act upon it accordingly, endeavouring instinctively, (for uterine action is not voluntary,) by successive and suitable efforts of its muscular coat, to propel it downwards; whilst the os and cervix will by consent, and, as transpires in the regular process of delivery, become dilated, and thus a part of the uterus will act on the rest, and carry on the displacement even to *perversio extrema;* but in every case, so long as the displacement progresses by descent, the abdominal expulsive efforts (recently in great activity, and readily re-awakened by the attending sensation of a fullness in the passage, of a foreign substance requiring to be expelled,) will be brought into action and assist in the process, so long as the patient is not in a state of insensibility. Where the inversion has proceeded to a certain extent, but its further progress by descent is prevented by the resistance of the parts closing the lower aperture of the pelvis, if, as I have explained to happen occasionally,[137] it go on to total inversion, by the remaining part of the organ rising as it inverts, this change must undoubtedly be effected by the uterus itself, and will take place in direct opposition to both traction and *nisus depressorius*. It must be remembered, in order to possess any distinct notion of the share the uterus has in effecting its own inversion, that the part assisting must be that situated between the cervix and the *angle of inflexion*,[138] *which* defines a circle, changing in its situation as the inversion progresses, and where the uterine walls, turning at an acute angle, cannot be capable of contracting, but must be considered in collapse.

Amongst the efficient causes of the second class, the expulsive abdominal nisus of the patient is chiefly to be noticed. This assists in every stage of the displacement downwards, from the commencement to external prolapse. It gives great aid in the production of *depressio,* and sometimes may be regarded as the principal power in activity for determining the most rapid inversion. Where the predisposing causes are strong and all present, the patient delicate and relaxed, her posture sitting or erect, and the uterus inert, a violent expulsive effort, made when there is no uterine contraction, expels rapidly the fœtus through a very relaxed os and vagina, and with it, or close upon it, the placenta and the

[137] See note 61 of Part I., and the corresponding text; also note 38 of Part I.

[138] See note 36 of Part I. of this Essay; also *Nannoni, Trattato d' Obstetricia*, ii., 36.

uterus inverted, which last quickly descend several inches beyond the external labia. The worst cases are of this description, and the abdominal *nisus* may be named as almost the exclusive efficient cause. Baudelocque[139] relates a case in point; he observed the uterine walls to be very thin, and from this and other signs, he feared inversion, and cautioned the patient to avoid straining, but she, being deaf, mistook what was said for an encouragement to make greater efforts, and inversion ensued, although the mind of the most experienced of accoucheurs, and the most learned of writers upon this subject, was intent upon its prevention. All sudden efforts in which the diaphragm and abdominal muscles are opponents, sneezing, coughing, &c.,[140] may not only help in causing inversion to begin, where concurring circumstances of strong predisposition are present, but are still more efficient in advancing the displacement. Continually in the published histories do we find that inversion, remaining latent and unsuspected for hours, or a day or two, has been increased to *perversio* and prolapse, under efforts at defæcation, or the voiding of urine, although it may be conjectured that, not infrequently, the sensation was delusive, and the real source of those sensations in the pelvis which induced expulsive efforts, was the inversion already present, and distending the uterine cervix or vagina. Pressure, and all weights placed upon the abdomen,[141] are calculated to aid inversion by propulsion, or as efficient causes of this second class; and it seems that in rare cases there may be causes acting in the same way, originating within the abdomen, it being related that where depressio was found on autopsy it had[142] been occasioned by "the sacro-vertebral angle of a deformed pelvis."

The efficient causes constituting the third class, and acting by traction, are not numerous. The first of them, relating to the attachment of the placenta to the internal fundus, which has already been named amongst the predisposing causes, shows how

[139] See Dailliez, *Thèse, Obs.*, 10.

[140] Deinzer enumerates "Laboriosa alvi exoneratio, tussis, sternutatio, singultus, clamor, saltus, situs erectus, ambulatio." (*Diss. de Uteri Inversione*, p. 14.)

[141] The habit which prevails in some countries of placing a bag of sand upon the abdomen after delivery, has been named as calculated to cause inversion when the uterus is in a state of atony. Expulsive and propulsive efforts rank next in frequency to pulling at the funis, amongst the determining causes of inversion.

[142] Boivin and Dugès, *Dis. of the Uterus*, by Heming, p. 117.

the two are linked together. It is by the funis being stretched or pulled at, during or after the delivery of the child, that traction is made, and inversion determined, by the placenta being attached to the fundus. In the majority of instances, the displacement is attributed to the midwife's pulling imprudently by the cord to detach the placenta; and when the surgeon meets with this accident, it is believed that blame attaches to him for the same reason. With a few exceptions, the censure thus implied or expressed is deserved. The inversion will more readily transpire if the placenta, or rather its funis, answer to the axis of the fundus. Occasionally, although there be no strong tendency to inversion, besides the presence of the placenta at the fundus, (the patient being robust and of good constitution, and the labour otherwise uncomplicated,) the displacement will be induced mainly, and almost exclusively, by the violent traction through the cord, and this is found to be one of the most difficult cases to manage, even if early attention be paid, because it can only happen from violent and most unjustifiable force[143] being applied. More commonly, where the constitution is relaxed and the predisposing causes are numerous and considerable, the slightest traction by the cord, even such as the experienced accoucheur essays, in order to ascertain if the placenta be separated and free, will prove sufficient to commence the inversion, which may be hurried on in its progress by uterine action and abdominal efforts, until *perversio* and prolapse are established, without any additional interference from without. The prudent accoucheur should, therefore, always recollect that a small beginning here leads to great mischief,—"*c'est le premier pas qui coûte,*"—let him be sure he has nothing to do with it. For want of a clear distinction being made and enforced upon the readers' attention, many writers have failed to obtain a correct conception themselves, and to afford proper instruction to others, of the difference as to the first commencement and the subsequent progress of uterine inversion. Some have thought that the weight of the placenta could have no influence in the one case or the other; but the

[143] Unwarrantable pulling by the funis is not unusual, and may be ranked as the most frequent immediate cause. The force used by the accoucheur is often extreme; and if the placenta happen to adhere to the fundus, the only protection against inversion is the funis giving way. Maygrier says of inversion induced in this way—"Accident funeste, malheureux—la honte de l'art et le coup de mort de la mère!" (*Diss. sur la Délivrance*, p. 86.)

large placenta, and the patient relaxed, as well as the uterus in a state of atony, the erect posture also contributing to the impetus, it is impossible to admit that the weight can have no influence. Whatever tends to increase the impetus downwards, in the axis of the uterine cavity, of the pelvis, or of the vagina, whether by propulsion, weight, or traction, must have its influence, particularly in increasing the displacement already begun. But the placenta, still attached to the depressed fundus, will act in another way. Its bulk distending the lower part of the uterus, or the vagina, will, as a foreign substance requiring to be expelled, call into action all the sympathising powers of the frame for effecting this expulsion, and as the placenta is driven down, the fundus comes with it. Those who argue that the placenta has no influence by its weight, (no one has referred, I believe, to its bulk and substance as concerned in the process now discussed,) have been like all supporters of a particular idea bearing upon the causation of inversion, limiting their arguments and restricting the question, as if the whole process were stated to depend on the one cause controverted.

There is another way in which traction by the cord may arise without external interference, and contribute to the very commencement of inversio. When the funis is very short[144] it is always very firm, and in the progressive delivery of the child it is stretched and pulled, so as to draw down the uterus with the attached placenta. This effect may happen from the cord being actually too short; sometimes it is not more than six or eight inches long,[145] a circumstance which might create no embarrass-

[144] It is singular how great are the variations in the length of the funis. Dr. W. Hunter remarked that it is sometimes little more than a foot long; at others, more than four feet; the common length being above two. His commentator met with a case at the General Lying-in Hospital, where the length of the funis was barely four inches; and quotes another reaching five feet eight inches. (*Description of the Gravid Uterus*, second edition, by Dr. Rigby, p. 28.) Dr. Blundell observes that the cord sometimes does not exceed seven or eight inches; and Dr. Haighton met with it still shorter. (*Obstet. Med.*, p., 447.) Baudelocque met with a cord eight inches long; it broke on delivery of the child; uterine inversion did not ensue. (Dailliez, *Thèse.*)

[145] Of short funis, accompanied by inversion, the following cases may be noted:— 1. The child was quickly expelled, bringing the placenta and inverted uterus with it to the vulva; the cord measured, at most, only seven inches. (Baudelocque, in Dailliez, *Thèse*, *Obs.*, 13.) 2. Where the cord did not exceed ten inches in length, inversion followed, and remained unreduced, the uterus being subsequently removed

ment when the placenta attaches itself to the lower part or body of the uterus, but may render *depressio* inevitable, when there is an attachment to the fundus. The well-told cases of this sort are more numerous than my able correspondent, Dr. Radford,[146] was aware of, but the best amongst them has been most recently narrated,[147] and with a degree of force and minuteness highly deserving of commendation. A perusal of this last case will supply all the characteristic symptoms attendant upon the progress of the displacement. The funis, although really long to an unusual extent, may *in effect be too short,* by being twisted round the neck or other parts of the body of the fœtus,[148] and aid the commence-

by operation by Mr. Newnham. (*Essay on Inversio Uteri*, p. 34.) Probably it is in reference to this same patient that Dr. D. D. Davis states, (*Principles of Obstetric Medicine*, p. 1088,) "that cases have been known of the umbilical cord not exceeding *two* inches in length." But this is surely a misprint; it may be safely asserted that no authenticated instance can be found of the cord being so short as *two* inches. 3. Funis so short as to create embarrassment in making the necessary ligatures after the child was born; inversion and prolapse in consequence. (W. Smith, in *London Medical and Physical Journal*, vi., 503.)

[146] After making reference to Dr. King's case of inversion, where several coils of the funis were round the neck of the child, and it was also twisted round one arm, (*Glasgow Journal*, i., 17,) Dr. Radford adds that, so far as he knows, there is but one such case published. (*Essays on Midwifery*, No. 5, p. 13.)

[147] By a violent pain the head of the fœtus was driven down to the perineum, where it stuck fast, the pains subsiding. An alarming rigor took place; cold perspiration dropped from the brow, and the pulse almost ceased. Hæmorrhage, or rupture of the uterus was feared; but the rigor went off, and, with one terrific pain, the head and shoulders of the fœtus passed out at the labia; complaint was loudly made by the patient, that the child's feet kicked the uterus so much they would be the death of her. The arms being liberated, the funis was seen to be so much on the stretch, that the skin at the navel was dragged out about an inch and a-half. The child's body being lifted up towards the mother, to relax the funis as far as possible, its feet were delivered; but severe pain was still complained of. The placenta was at the *os externum*, attached to the inverted fundus; fully three-fourths of the uterus was displaced, girded above by its os and cervix; it was reverted without delay, and no further evils ensued. The funis was not more than six inches long, or about eight inches when on the stretch; the placenta was remarkably small. (*Case of Inversion of the Uterus from short Funis*, by R. Smith, of Aberdeen; in the *Monthly Journal of Medical Science*, May, 1846, p. 359; also *Braithwaite's Retrospect*, xiii., 452.)

[148] Baudelocque relates an instance of inversion, from the funis being in effect too short, forming two circles round the neck, three about one leg, and one about one arm; the placenta was expelled with the child, still attached to the inverted fundus. (Dailliez, *Thèse*, *Obs.* 9, p. 66.) Dr. William Hunter met with the cord encircled four times round the neck of the fœtus. (*Anat. of Gravid Uterus*, by Rigby, second edition, p. 28.) The cord, although not short, may still be the immediate medium

ment, *depressio*, under a placental attachment to the fundus. If the funis were merely stretched during gestation, it would be too thin to allow of much traction arising in the progress of delivery; but it undoubtedly grows in all its dimensions, under what John Hunter would denominate *a stimulus of necessity*, and presents its usual firmness and size, affording sufficient resistance under the traction inevitably exercised upon the uterine fundus.

The delivery of the fœtus requires a short notice. Its rapid descent in a precipitous labour, particularly under a perpendicular posture of the body, tends to induce or add to an inversion, if there be strong predisposing causes. After the head is born, and whilst the uterus is quiescent, if the body of the fœtus be forcibly and quickly removed, this injudicious proceeding will, upon the principle of a tendency to a vacuum, draw down the relaxed fundus, and induce *depressio*. This cause, acting by traction, will, however, be always aided by expulsive abdominal efforts, which are readily aroused, although there may be no uterine pains.[149]

If the placenta, located at the fundus, be from any reason preternaturally adherent, it too frequently becomes an additional temptation to the exercise of traction by the funis, and thus cause inversion. If the uterus have become inflamed, from an external blow or any other cause, in the part answering to the placental surface, such a morbid adhesion of the placenta may be the result; and where a polypus, or fibrous tumour, corresponds to the surface occupied by the placenta, the adhesion will be too strong, or rather the natural means of *decollation* will be impeded, and the production of inversion endangered.

of effecting the inversion, particularly when the child is precipitated; even if the cord be torn through, inversion may be induced; it was so in Canolle's case. (Note 43 of Part I. of this Essay.) Levret has a similar one; the child killed by the fall. (Dailliez, *Thèse, Obs.* 14.) Mr. Ferrier, a surgeon, informs me that he was called in haste, and the child was born before he arrived, and had fallen to the feet of the bed, which was lower than the rest; by this the cord, being twisted round the neck, was put tensely on the stretch. When he moved the child, so as to relax the funis, it was not drawn up at all towards the vagina, for there was *depressio* already induced.

[149] "Bei einer schnellen Geburt eines Kindes welches mit den Eihäuten uber den Kopf durchschneidet, wo die Placenta mittelst der Eihäute herabgezogen wird und den Gebärmuttergund mit hervortreibt." (Carus, *Lehrbuch der Gynacologie*, s. 446.) Most follows Von Siebold, by placing amongst the causes of inversion "Die normwidrige Verwachsung des Chorions mit der Gebärmutter." (*Encyklopädie der Med. and Chir. Praxis*, ii., 692.)

The mal-praxis of the midwife, or accoucheur, can only cause the commencement of inversion by forcible traction by means of the funis; but where the fundus has already descended, and been mistaken for a tumour or polypus, its removal has been attempted, and thus the displacement ignorantly, and often most barbarously, brought to the greatest degree, almost solely by too effectual traction.

The term *spontaneous* is so often applied to inversion of the uterus, that it becomes advisable to explain what is meant by it. Writers have created confusion by using this epithet in more than one signification. First, and most commonly, it has been applied to all those cases where it is supposed that the inversion took place without any external aid or interference, without the attendant or accoucheur having anything to do with it, or even in spite of any efforts which his foresight might have made to prevent it; and secondly, to those cases where the uterus, on account of its previous condition, and by its own action at the moment,[150] inverts itself. In this latter sense I do not believe that inversion can ever be spontaneous, as regards the whole of the process, although the uterine action, solely, may increase the inversion when once it is commenced. Spontaneous inversion in the former sense may, and does, undoubtedly occur,[151] but less frequently than the

[150] Dr. Robert Lee uses spontaneous in this second acception when he remarks, "It must be evident that the uterus cannot be inverted by its own action; there must be something to draw or push it down." (Lectures in the *London Medical Gazette*, August, 4, 1843, p. 658.) A recent writer combatting spontaneous inversion, is also referring to this second acceptation; regarding the uterus as passive, and yielding in the direction of the power applied, he concludes—"It is absurd to imagine that the uterus, by any active motion of its own, could be turned outside in." (Dr. Christie, in *Monthly Journal of Medical Science*, May, 1846, pp. 355–9.) It is true enough, perhaps, that the organ cannot be so turned inside out, taking the whole of the process; but there is a stage of the displacement, in which one part of the uterus may act on the rest, so as to increase the inversion; this cannot be denied.

[151] Spontaneous cases of this class have occurred in the hands of the most experienced, and ought to be kept in mind, in order to remove every inducement for concealing what happens in the hands of others; the true statement divulged will, in the end, be equally advantageous both to science and the public. Ruysch, who had so often been summoned to replace the uterus inverted by the ignorance of others, could hardly believe the case when it happened to himself: the placenta being away, "Interim momento citius, uno impetu, sequebatur hanc sua sponte inversus uterus." (*Advers. Anat.*, December 2, p. 38.) Baudelocque details a case of spontaneous inversion in his own practice. (Dailliez, *Thèse, Obs.*, 12; also No. 38 of Part I. of this Essay.) In Tobias Browne's case, where the cord was very putrid, the surgeon

published statements represent, as the midwife or accoucheur concerned has always too strong inducements for representing his own position in the most favourable light.

Before quitting the subject of causation, as applied to the parturient condition, I may remark, perhaps with some utility, that in enumerating the causes of inversion *seriatim* and singly, as seems unavoidable in every endeavour to view them systematically, I ought to guard against the error of referring the displacement to any one cause exclusively; not only must the predisposing and efficient unite, but usually there will be a plurality of each contributing to the process.

The general statements hitherto submitted apply exclusively to uterine inversion immediately connected with parturition. It may be well to consider the causes where polypus is concerned, which

could not be much concerned in causing the displacement. (*Mem. of Med. Soc. of London*, v., 202.) A. E. von Siebold asserts, that, of numerous cases to which he had been summoned, six happened without any violent or improper treatment. (*Handb. der Frauenzimmerkrankheiten*, iii., 365) Velpeau confirms two cases from Le Roux, where the abdominal and uterine nisus produced inversion without the accoucheur's interference. (*Leçons Orales*, ii., 414.) In Dr. Radford's second case, the funis had not been taken hold of when the inversion happened, the patient being up and leaning forward on the bed at the time the child was born. (*Essays on Midwifery*, No, 5, p. 5.) This last author is one of the most ingenious and powerful advocates for the doctrine, that uterine inversion results from, and, indeed, is produced by, the uterus itself, the fundus contracting powerfully, whilst the cervix and os are in a state of atony:—"The *fundus* and *body* of the uterus, so far from being in a state of *collapse* or *relaxation*, are really in a state of unnatural *excitement* and *action*;" whilst the os is soft and yielding, and "offers no resistance to the coming down of the tumour, whose protrusion is forcible and rapid." In order to arrive at these conclusions, it appears to me that Dr. Radford has disregarded the influence of the abdominal nisus, and been misled by making no distinction between the commencement and the subsequent progress of the displacement. One argument, fatal to his doctrine, is, that he admits the placenta to be still adherent to the fundus, even at the completion of the process, in a great majority of the cases quoted from his own experience; and such adhesion is usually regarded as a proof that *powerful contraction* of the corresponding part of the uterus *has not taken place*. (See *Ibid.*, pp. 15, 17.) Dr. Churchill assents to the correctness of Dr. Radford's ideas. (*Practice of Midwifery*, p. 430.) Dr. T. Herbert Barker has supported the same views, with a degree of fervour calculated to elicit the truth. (*London Medical Gazette*, April 5 and 12, 1844.) Another writer, with still less success, has affirmed the like doctrine. (Clarkson, in the *Lancet*, December 18, 1844, p. 404.) It is desirable to have the question settled, as the representation that inversion begins by strong contraction of the fundus, if erroneous, as I believe it to be, seems calculated to have a very injurious effect in practice, as, indeed, every erroneous doctrine must have.

rarely gives rise to the displacement, unless attached at or near to the fundus. As the polypus grows, it necessarily distends and enlarges the uterine cavity; it also weakens the walls of the uterus by constant irritation and the attendant menorrhagia. So long as the polypus remains supported in the uterus, no inversion takes place. Increasing in size, the polypus (or fibrous tumour in a polypoid form,) excites the uterus more and more to expulsive efforts; but until the os and cervix dilate, and the polypus projects beyond these, not even *depressio* is produced. The progress of the inversion will be mainly effected by the uterine action, adapted to expel its contents, and assisted by abdominal nisus. The polypus having projected at the os uteri, if its remaining part be conical towards its pedicle, the contraction of the uterus upon it will, upon mechanical principles, aid its descent; if the largest part of the polypus pass the external labia, the same observations will apply, the sphincter vaginæ in its contraction pressing the polypus downwards and increasing the inversion. Opposite opinions have been expressed as to the influence of the mere weight of the polypus;[152] the effect of the weight must be greater or less according to the position of the patient, but when we consider the

[152] Ambrose Paré, Von Sanden, Deleurye, Lassus, and a host of other writers of great repute, have referred to the weight of the polypus as alone determining the inversion; even Morgagni (*De Causis et Sed. Morb.*, ii., 395,) says, "Suo pondere invertit uterum, deorsumque tradit;" but he had at the time Von Sanden's case in view, to which I have already fully adverted. (Notes 97, 98, of Part I.) Many English authors take no more comprehensive view of the inversion than as its production is influenced by the weight of a polypus; even Sir C. M. Clarke goes no further, believing that "the polypus must be very large and heavy." (*Dis. of Females*, i., 142.) Ségard attributes much to weight of the polypus, provided "Son pédicule est ferme, compact." (*Dis. sur les Polypes*, p. 13.) Dr. Lever, referring to such a case as is outlined in fig. 16, Section IV., Part I. of this Essay, attributes all to weight, (*On Organic Dis. of the Uterus*, p. 88,) and it is scarcely possible to examine the outlines and cases given by me in Section IV. without being impressed with the influence the weight and size of the polypus must have in a certain advanced stage. Not less strong or exclusive are the advocates on the other side of the question. Dr. Denman, finding the uterus inverted where the polypus could not have weighed more than an ounce, and had scarcely any stem, conceived that it could not have happened mechanically, but "by its own vehement action excited to expel the polypus, a perpetual cause of irritation." (*Midwifery*, fifth edition, p. 70.) Dr. D. D. Davis, with much *naiveté*, observes that this is the only published example of an unimpregnated uterus being inverted without a mechanical cause, and by the action of the organ itself! (*Obstet. Med.*, p. 73.) Dr. Oldham deems the weight of the polypus insufficient, and looks rather to the action of the uterus in its attempt to effect its expulsion; he "knows of no instance where *the residing intrinsic force*

large size of many polypi,[153] it can never be allowable to state that the weight is not a powerful cause in commencing and increasing the inversion. Where inversion is suddenly produced by the expulsion of a polypus, with all the pains, efforts, and proceedings of a premature delivery, the weight has, indeed, little concern in the changes induced; but there are conditions under which the weight of the polypus will be the chief cause of the increase of the inversion, such as when it has escaped from the uterus and lodges in the vagina, and more especially when it projects beyound the labia externa. In the latter stages the weight of a polypus, particularly the fibrous, is the principal if not the sole power in action, for converting *perversio extrema* into total inversion, and in carrying the displacement still further, till the vagina itself follows.

In the example of hydatidous placenta[154] which has been recorded in these pages, it would seem that the inversion was mainly produced by the patient's own manual efforts to relieve herself of the mass, and was, therefore, caused chiefly by traction. Where coagulated blood, or any fluid contents, distend the uterus, and inversion occurs, it happens on the sudden discharge of these

is so well exemplified." (On Polypus of the Uterus, and its co-existence with Pregnancy, in *Guy's Hospital Reports*, New Series, No. 3, April, 1844, p. 105.) Dr. West accords with these views:—"The inversion is the result of the action of the womb in its efforts to expel the polypus, rather than the mere weight of the polypus." (*British and Foreign Medical Review*, xix., 22.) It is proved that the weight has much influence, and that it fixes the inversion, if it has not induced it, by the circumstance so uniformly observed in all the lesser degrees of the displacement; that, on the polypus being removed, the inversion is speedily replaced, whether by the elasticity of the round ligaments, or by the *ressort propre* of the uterine walls.

[153] The authenticated histories of polypi weighing from an ounce or more to several pounds are so numerous that it is scarcely necessary to refer to them; I may, however, subjoin the following:—Denman particularizes an operation for one of four ounces in weight, (*Midwifery*, fifth edition, case 1, p. 69;) another, of one pound four ounces, dragging down the fundus uteri inverted, (*Ibid.*, p. 74;) the largest he ever saw weighed two pounds three ounces; it was successfully removed by ligature. (*Ibid.*, case 5, p. 72.) Langenbeck refers to polypi of different weights—three pounds, four pounds, seven pounds, ten pounds and a-half. (*Nosol. and Ther. der Chir. Krankheit.*, v., 163.) Treating of fibrous tumours of the uterus, Dupuytren remarks,—"Le volume varie extraordinairement; de la grosseur d'un grain de millet, ils peuvent acquérir celle de la tête d'un adulte, et du poids de quelques grains, arriver à celui de douze ou quinze livres. Le plus gros que j'aie rencontré sur le cadavre pesait vingt-cinq livres environ. (*Leçons Orales*, iii., 461.)

[154] See Section VI. of Part I. for Dr. Thatcher's case.

contents respectively, and by partial *inertia* under irregular uterine contraction. *Depressio* thus commences in the collapsed part, under abdominal propulsion, and is increased by the conjoined influence of this determining cause and uterine expulsive action.

When inversion is designedly produced by the operator, in lowering polypi for their removal, it arises chiefly by traction, assisted by expulsive abdominal efforts, &c.; the same explanation is applicable to all instances of inversion attending the removal of large fibrous tumours by operation.

The preceding review of the different causes of inversion of the womb, however imperfect, has been written under the conviction that a correct rationale of the causes will facilitate a knowledge of the rules for prevention and treatment; nor is it less true that the treatment found by experience to be successful will throw some light upon the causes. The numerous references and quotations which I have ventured to put in type, are mostly excluded from the text, in order to avoid encumbering the reader with more than he might desire; and they may serve to show, on an occasion, the danger of each writer considering his own spontaneous thoughts and suggestions as quite new to the public, however original they may have appeared to himself. Much of what is put forth as new has been previously entertained and placed on record. I have, however, been enabled to avail myself of a part only of what our almost boundless literature, confined to no clime, country, or language, is capable of affording to the persevering inquirer.

SECTION XI.

ON THE DIAGNOSIS OF INVERSION OF THE WOMB.

Were I required to name the most essential point to be attained in respect to any serious and fatal malady, I should certainly say *its correct diagnosis,* without which the most exact knowledge of the right treatment must be unavailing, except in so far as the same treatment may be applicable to two or more different diseases. In no instance has the importance of a correct diagnosis been more strikingly illustrated than in uterine inversion, which

has been mistaken more often, in proportion to its frequency, than any other malady of *its class*, and, perhaps, of *any class*. These mistakes have usually been attended with the most fatal effects, for many are the examples, attested by the best authorities, where it is observed that, had the nature of the case been timely known, it would have been rightly treated, and life easily saved.[155]

In commencing this section by considering *recent inversion*, I find reason to remark that errors in its diagnosis have frequently been but hasty and inconsiderate impressions, which a moment's reflection would remove; or they have arisen from the want of previous experience, and the absence of all suspicion, owing to the real or supposed rarity of the displacement. But in this, as in all other occasions, the error may be based upon a want of natural acuteness, or acquired tact; upon feeble powers of the mental faculties, or carelessness in the use of them. The diagnosis of recent inversion would generally be easy, if the mind of the accoucheur, besides being well-informed, were also awake to the evil; and I feel bound to add, that in the subject of diagnosis generally, the presumptuous rashness of even the experienced public surgeon now and then hurries him into errors which, under the check of proper modesty, would have have been easily avoided by his giving deliberate attention before deciding on the nature of the case. These remarks appertain more to medical morals than to the distinguishing signs of any malady; but I am led, however incautiously, to submit them on this occasion, from having observed that the moral condition and deportment of the surgeon has ever a preponderating influence upon the practical application of his abilities and knowledge, whether for or against his patient.

The short and dogmatical rules of some of our most esteemed writers,[156] would indicate the diagnosis of uterine inversion to be

[155] See Horteloup's case, in note 61 of Part I. Paul Portal remarked on an undetected case to which he was called:—"Si on avoit remis la matrice dans le moment qu' elle fut versée ou renversée, elle n'en seroit pas morte." (*Prat. des Accouchemens*, p. 329.)

[156] Sir C. M. Clarke says,—"Inversion consists of such a displacement that the fundus comes through the os uteri," a definition that would lead to all the earlier stages being overlooked. (*Dis. of Females*, i., 141.) Dr. Gooch makes the distinguishing marks to be "the time of its first appearance," which must have been immediately after delivery "and its sensibility." (*Diseases peculiar to Women*, p. 263.)

very easy; the authentic records of our art seem to show the contrary, even as regards recent inversion *post partum*, which in its earlier stages has been mistaken for the head of another fœtus,[157] or for another placenta;[158] for a mole, an excresence, a polypus, a tumour, and a clot of blood; and, in its more advanced stages, for not only some of these, but for still more unaccountable diseases or displacements.[159] It is very difficult to explain the

[157] The inverted fundus was so hard, that it felt like the head of a child, and for such he at first mistook it. (Smart, in *American Journal of the Med. Sc.*, xvi., 81.) On autopsy the uterus was missing, and the surgeon acknowledged that in extracting an adhering placenta he had inverted the uterus, which he took for the head of a second fœtus, and not being able to extract it, he applied his forceps, and drew the parts away." (J. Ramsbottom, *Pract. Obs.*, i., 297.)

[158] The most frequent mistake is to regard the inverted fundus as a second placenta. In one case, the surgeon was about to remove it, considering it a mole or tumour; but the woman died, and the true statement was only discovered on autopsy. (Le Blanc, *Précis des Opérations*, p. 357.) Saxtorph's first case had been taken for a polypus, and attempts had been made to pull it away before he arrived. (*Acta Soc. Med. Havn.*, iii., 402.) The inverted uterus had prolapsed externally, eight days after delivery, and was replaced in the vagina. The woman was conveyed to an hospital, where the surgeon found a tumour in the vagina, which he took for a polypus, and proceeded to remove it by seizing it with *des pinces de museux*, and brought it out at the labia, before he discovered the nature of the case. The part was immediately replaced in the vagina, afterwards the inversion reduced, and agaric left in the uterus to prevent a relapse: death happened from metro-peritonitis. (Voisin, in *Gazette Médicale*, 1832, p. 422; and Velpeau, *Leçons Orales*, ii., 420.)

[159] Even recent inversion at delivery has been mistaken for a retroverted and prolapsed bladder, and several authors speak of its being regarded as a vaginal rupture. A correspondent writes that, being called to a case of prolapsed inversion, where the placenta was still adherent to the fundus, the accoucheur in attendance, having never met with a case before, expressed his apprehension that "he had to contend with a case of aneurism of the uterus, such was the active throbbing of the vessels of the organ, which, with its great size, led him to form this opinion." It is certain that the accoucheur had studied aneurism more than *inversio;* he, nevertheless, describes well the symptoms present on this emergency:—"Endeavouring to detach the placenta gave the patient great pain, and a sensation as if I were dragging her inside out, (to use her own expression,) attended with very considerable hæmorrhage, every time I made the attempt to remove it. She also felt as if a cord were bound tight round her body, with great disposition to vomiting; pain down the extremities, with exceedingly quick pulse and pallor of the countenance; in fact, she had most of the symptoms of strangulated hernia." The placenta having been detached, and the uterus replaced, all the formidable symptoms quickly subsided, and she recovered, suffering only from leucorrhœa for three or four months. Amongst the diseases mistaken for uterine inversion at delivery we have the following:—"A protrusion of the rectum of such a magnitude, and so intensely distended, as to conceal all the passages from the pelvis, was supposed to be a case of procidentia, with inversion of the uterus." (*Johnson's Med. Chir. Review*, xxv, 37.) I take this to have been,

source of all these erroneous impressions, which not only midwives, but even well-educated and practised surgeons, have acknowledged, until we consider that the emergency is great and sudden,—some opinion or another must be rapidly formed, and those ideas with which the mind is more familiar first present themselves. The pressing urgency of the circumstances is even greater than the surgeon estimates them to be, for uterine inversion, at the close of delivery, is a case that leaves little time for consideration, none for preparation, ere a decision must be arrived at, or the risk be incurred of the patient's expiring of her undetected, or misunderstood, and consequently maltreated, disorder.

What has been remarked in the preceding section requires to be fully borne in mind in considering the diagnosis; and if a repetition of any of the symptoms should occur, it must be assigned to the admitted necessity of having a clear understanding of the subject now to be considered.

In the slightest degree of recent inversion, (*depressio,*) there may be nothing more than menorrhagia to indicate what has happened, until, on examining above the pubis, you are able to detect a cup-like depression, or dimpling of the fundus. Until the fœtus is fully delivered, no further tact-evidence can be gained; and even after this, if the placenta be still partially within the uterus, you are precluded from gaining more information, unless the hæmorrhage be sufficient, as usually it will be, to warrant your introducing the hand and detaching the placenta. As soon as the placenta is away, if there be any grounds for suspecting *depressio,* (and it is warrantable to entertain such a *suspicion* whenever *copious hæmorrhage* continues,) the hand should be introduced freely into the uterine cavity, in which will be felt a prominence, like a piece of sponge, or a second placenta, convex, more or less yielding, sometimes so soft and evasive as to be just evident to the touch, at others tense, like a bladder distended with water; or you find only a soft mass from which the blood issues,

not a descent of the bowel per anum, but a bulging of the anterior and dilated wall of the rectum into the vagina, and increasing till it prolapsed at the *labia externa*, a very troublesome displacement, to be palliated but scarcely to be cured. It could only be momentarily confounded with the inverted uterus. The covering membrane being the vagina, is unlike the lining of the uterus; the finger introduced within the *sphincter ani* and curved forwards, enters the large pouch, and the uterus remains to be felt *in situ* above the pubes.

answering to the seat of the inversion, which is usually at the fundus. A convex prominence into the uterus, with a corresponding dimpling or depression towards the abdominal cavity, both ascertained by the touch, afford the characteristic evidence of simple *depressio*.

In *introversio* the constitutional symptoms, both local and general, are much stronger, and more readily arouse the attention of the accoucheur to the necessary investigations. The sudden failure of the pulse, almost to complete syncope, with distress and fulness of the vagina, and pain in the loins, all greater than the sanguineous loss, perhaps, will account for, leads to a suspicion of the evil. In most women, save the very corpulent, the abdominal parietes are thin and yielding after delivery, and through them the depression of the fundus can be detected, above the ossa pubis. But in a large pelvis, and the *introversio* passing to the greatest degree, the placenta also being delivered, it may be necessary to get a bearing upon the contracted os uteri with the fingers introduced *per vaginam*, so as to push the uterus upwards, whilst with the other hand you feel the circle marking the depression above the symphysis pubis. If the placenta be not away, it fills the vagina, and may still occupy the os uteri; but when the vagina is free, the os uteri may be found dilatable, so as to receive the hand, which discovers the lower half of the uterus filled by a convex tumour, formed of the inverted upper half of the organ. There needs be no hesitation in making proper efforts for this internal investigation without much delay, as it may be required for the treatment, if not for the diagnosis. If the uterus do not grasp the inverted portion, the hand may proceed between the two, and the tumour will be found with a large base. It is symmetrical, its surface indentical with the rest of the lining of the uterus in texture and liability to bleed. It is also elastic, yields to pressure and recovers itself, is more or less painful to the touch; it is equal to the size of the fist at least, and at the inferior, or presenting part, feels jagged, and as if covered with coagulated blood, indicating the spot to which the placenta adhered. Whenever, after delivery, such a tumour is found within the os uteri, conjoined with the absence of the fundus uteri, and the discovery of a circle bounding a depression or hollow, on investigating above the pubes, there can be no doubt about *introversio* being present. On

examining by the rectum the uninverted portion of the uterus may be felt, but the finger cannot reach beyond it, so as to gain any additional evidence of the displacement.

In *perversio* the inverted fundus occupies the vagina as a soft convex body, and the hand may be passed up till the encircling cervix is felt; and within the cervix the finger may be passed all round the tumour, which is scarcely narrowed into a neck; but only by the aid of a large long probe or sound,[160] can you trace the depth to which the uninverted portion of the uterus embraces the inverted. The depth of this cul-de-sac, however, will be the same in all parts of the circle, and the extent to which the bougie will pass within the cervix, will indicate how near the displacement approaches to *perversio extrema*. When in this last degree, the inversion may so fill the vagina, and the cervix be so high, that the latter cannot be reached by the finger, or the hand cannot be introduced *in vaginam;* a judgment must be formed by examining externally above the pubes, where the absence of the uterus from its proper site near the umbilicus, and the detection of a circular ridge and depression above the pubes, will give the satisfactory evidence. It cannot, however, be too strongly pointed out, for practical purposes, that the uterus itself, whilst inverted to the degree above named, or even totally, may rise so far above the pubes, and present so large and firm a tumour,[161] and at the same time so

[160] We are indebted to Professor Simpson, of Edinburgh, for the increased use of the bougie, or probe, in assisting us to diagnose inversion of the womb, both recent and chronic, from all those maladies to which it is symptomically allied. Whenever, in any suspected case, after delivery, the hand can be introduced into the uterus, it should be used, and the uterine sound is not required. Under the reverse condition the sound is available. The depth of the uterine cavity after delivery may be eight or ten inches, at least, and the inversion encroaches upon that cavity in proportion to its degree. In *perversio extrema* the bougie can be passed within the cervix only to the depth of about an inch, and the cavity is the same depth all around the stem or summit of the inversion. See further on the use of the bougie in notes 181 and 193 of this Section. Busch and Moser describe fully the use of the sound, or bougie, introduced into the uterus, for diagnosis. (*Handb. der Geburtskunde*, ii., 451, 1842.)

[161] Denman remarks how liable is the accoucheur, on a superficial examination, to be mistaken about feeling the contracted uterus above the pubes. (See *Practice of Midwifery*, fifth edition, p. 539, and Section IX., note 71, of this Essay.) Dailliez states that Baudelocque detected uterine inversion in three cases, where the accoucheur in attendance had believed he felt the uterus contracted, and in its natural condition above the pubes, just after delivery. (*Thèse*, p. 70,) When there is hæmorrhage, however, after delivery, and the uterus cannot be felt above the pubes, it must not

small a circle at its highest point, where its fundus ought to be, as to lead the surgeon into the erroneous conviction that he has felt the contracted uterus *in situ* immediately before quitting his patient, who subsequently proves to have an inverted uterus. Several undoubted instances of such an oversight are on record, and many further errors have been the fruit of it; but who can believe that the surgeon did not at the same time fail to appreciate some of the symptoms,—the fulness in the pelvis, the continued pain, the failure of the pulse and general distress, which ought to have indicated to him that all was not right, and his patient not in a condition to be left without instituting more strict and close investigations? The tumour in the vagina in *perversio*, or total inversion, may be inspected by the sight, and will be found of a florid colour, covered with a very vascular velvetty surface, easily bleeding on the slightest touch; or if the presenting part be that to which the placenta was adherent, it will be uneven, of a dark hue, and with placental shreds, or coagula, attached to it.

When the inversion is total, although unattended by prolapse, the diagnosis is not difficult, if the whole hand can be carried into the vagina, for the tumour will fill the vagina, which terminates in a regular cul-de-sac all around the neck (if neck it may be called, where there is so little diminution of circumference,) or highest part of the tumour, uncomplicated by any lip or aperture. The membranous covering of the inversion will offer the same impressions as to colour, texture, and other properties, whether to the eye or to the touch, as have been stated to belong to partial inversion occurring in the greatest degree, except only that the colour will never be purplish or venous, because there is no constricting cervix impeding the venous circulation. So large is the uterus, when totally inverted immediately after delivery, and still retained within the vulva, that it rises considerably above the pubes, allowing the circle formed by the contracted cervix to be felt through the abdominal parietes. The contraction of the

be hastily concluded that there is an inversion. The uterus may be in a state of atony, accounting for the hæmorrhage, and cannot be felt until it contracts. Boyer observes that there is generally an instant after delivery, when the uterus is in atony, and can scarcely be felt until it contracts. Levret (*Suite des Obs.*, &c., p. 280,) remarks upon the difference between the pain attending inversion of the womb and the after-pains,—"La première est continuelle, au lieu que les autres sont entrecoupées."

inverted cervix, under these circumstances, may be so strong as to leave very little aperture, and only a very small circle, which the surgeon fails to detect, and concludes that the tumour felt above the pubes is the uterus properly contracted and *in situ;* but the constitutional symptoms, which will not fail to be urgent, should point out the contrary, and lead to the investigations calculated to elucidate the real state of the case.

The inverted fundus uteri, prolapsed externally, would never be mistaken, were the surgeon's mind duly impressed with the possibility of this displacement occurring in his hands; and if for an instant he hesitates or errs, a moment's investigation will put him right; and so it needs be, for all minute rules of investigation are so inapplicable under the urgency, that the patient may be lost whilst the surgeon is studying to apply them; he must be satisfied with finding the uterus entirely absent from the abdomen, and the patient pulseless, whilst a tumour is depending at the vulva, exhibiting to the touch and sight the external characters already alluded to; but should the state of the patient admit of further research being made, the finger can be passed high enough up the rectum to ascertain that the uterus is absent. When there is complete prolapse, and the vagina also inverted, there is surely no possibility, save by the uneducated person, of mistaking the case. The vagina is either shortened, or wholly obliterated, and the inverted part of it forms the tubular and yielding neck which connects the inverted uterus to the external labia. The uterine mass, thus externally placed, is either flattened and soft, or rounded and tense, according to its relaxed or contracted condition; and in passing from one of these conditions to the other, it exhibits vital phenomena perfectly characteristic.

The necessity for again referring to the different conditions with which uterine inversion at delivery has been confounded and mistaken, arises not so much from the want of new rules as of more caution and attention in the accoucheur. The inverted fundus bears no resemblance to the head, or even to the breech of a second fœtus, if attentive examination be made before coming to a conclusion. To mistake the one for either of the others, proves extreme inattention to the constitutional symptoms which always accompany inversion, and total neglect to examine the uterus through the abdominal parietes. The same may be remarked of

moles and all imperfect products of fœtation, which produce no formidable symptoms like inversion, and are accompanied by no depression or dimpling of the fundus. If we read of a flaccid inversion of the fundus uteri having been torn and maltreated under the idea of a clot of blood, what can we say for preventing such barbarity but to inculcate caution and gentleness in every step of midwifery practice, even in the removal of a supposed coagulum, and to assert the not infrequent occurrence of partial inversions of the uterus?

The question of diagnosis between a polypus and inversion of the womb cannot be so summarily dismissed. Although the occurrence is rare, it is well known that polypi may precede and accompany pregnancy and complicate delivery;[162] and as they grow faster during pregnancy, their size may be so considerable at delivery as to resemble in this respect the inverted fundus. The surgeon's mind is so impressed with the occurrence of polypus, that he thinks of it often to the exclusion of the other malady, but without reason, as it appears, for polypus of the womb is not a more frequent complication of delivery than its inversion. Polypus is not attended by the constitutional *défaillance*, which so generally accompanies inversion of the womb. If you press up a polypus as far as you can, it still remains an undiminished tumour, but an inversion, similarly treated, disappears, and the patient regains ease, and may begin to rally. A vesicular polypus has a narrow

[162] I have more than once met with uterine polypi complicating delivery, but never considered that they should be immediately removed, but that the right practice was to put them back and to delay until a proper opportunity. The best writers have followed this rule. Lisfranc removed a polypus fifteen days after delivery, but the patient had become bloodless from hæmorrhage, "elle était presque anémique." (*Clin. Chir.*, iii., 156.) Professor Simpson found a polypus descend after premature labour. (*Lond. and Edinb. Month. Journal,* 1843, p. 52.) The most interesting case of pregnancy with polypus is related by Dr. John Ramsbottom. (*Pract. Obs. in Midwifery*, ii., 473.) It is related that a midwife took a polypus at delivery for a clot of blood, and tore it away, and with it the uterus inverted; gangrene; death. An accoucheur used his forceps to extract a large polypus, under the idea that it was a second child's head. One blade of the forceps broke, but he persevered with a fresh instrument, and brought away the uterus and both round and broad ligaments. A polypus having descended at three successive labours, Denman, on this third occasion, and, after one day's delay, attempted its removal by ligature without success. He removed it after four or five months had elapsed. (*Med. and Phys. Journal*, xxvii., 467, and *Davis's Obstet. Midw.*, p. 615.) (Segard, *Thèse*, p. 35, another case.)

neck usually, and cannot then be mistaken for an inversion, unless by oversight and imperfect research. The firm fibrous polypus has a broad basis, like an inversion, but differs in being generally nodulated and irregular, and is never yielding and elastic. Polypi occupying the cavity of the uterus never are accompanied by inversion, so that there is no cup or dimpling of the uterus (the sure proof of inversion,) to be ascertained through the abdominal parietes. The uterine sound may be used, and will pass several inches within the uterine cavity if tried in different directions, as the polypus, if attached any where below the internal fundus, will impede the instrument only in one direction, whilst the cul-de-sac formed at the angle of reflexion where the uterus is inverted, impedes the bougie at the same depth in every part of the circle. But the great resource in endeavouring to diagnose when a tumour presents at the os uteri or in the vagina after delivery, is the introduction of the hand. Fibrous tumours, without any neck, and attached by a broad basis, will present the greatest difficulty if situated at the internal fundus, and an examination through the abdominal parietes must be added, in order to ascertain whether or not there be a dimpling corresponding to the tumour felt projecting into the uterine cavity; such dimpling will always be present in in inversion, (*depressio,*) and its absence will prove there is no inversion.

The mistaking of an inverted fundus for a polypous tumour would be less dangerous, if the operator would feel it to be his duty to press it back; but he commits a further mistake in supposing himself authorized, in an unusual case, to adopt a practice for which he has no authority, and he increases the displacement, or even destroys his patient, in the exploit of effecting the removal of the supposed tumour. It is remarkable that, at delivery, a polypus presenting has rarely been mistaken for an inverted fundus, which would be less injurious by not leading immediately to any mal-praxis. If the tumour to be diagnosed be found very sensible to the touch, it must be an inversion; but the converse is not true, as the uterus is not always sensible, nor a polypus always the reverse. The soft polypus never is sensible, but a further caution must be added in regard to a degree of sensibility, sometimes residing in the covering of a fibrous polypus, which might mislead, as will hereafter be more fully remarked upon.

Authors of great repute, modern as well as ancient, have described a prolapse of the lining membrane of the uterus simulating an inversion. Having no experience of any such a pathological condition myself, and finding none recorded by any British authority, I can only notice it as belonging to the literature of the subject under review,[163] and shall be glad if what I quote tend at all to enlighten us.

So rapidly does even the inverted uterus diminish when retained in the vagina unreduced, that two or three weeks after delivery it resembles a small pound-pear in size as well as shape, and a knowledge of the dimensions of the displaced organ, at stated periods during its decrement, will facilitate its diagnosis. Such knowledge may be gained by keeping in mind what has been already stated upon this part of the subject.[164]

Although recent inversion *post partum* has been so often misunderstood, owing chiefly, perhaps, to the necessity for promptly deciding, it is to chronic inversion that attention requires to be most especially directed; for its diagnosis may be difficult even to the ablest and most experienced men, and frequently can only be accomplished by repeated examinations and consultations, which, happily, are admissible in this stage of the displacement.

So rarely are the minor degrees of inversion found in the chronic stage, that what follows must be regarded as referring to either *perversio* or to total inversion. Of the two the latter is the more simple, but by far the less frequent. It presents a pyramidal tumour, scarcely equalling in size the healthy uterus; the greater part is downwards, and the upper part, or neck, presents, generally, a ring or induration, answering to the inverted cervix, just above which the vagina is reflected *en cul-de-sac*. The

[163] "Ast demun est membrana interna, ab uteri fundo, vel corpore divulsa prolapsaque, molis ista apparet mollis, membranacea, et si sanguinem extravasatum continet, fluctuans." (Weber, *Diss. de Inv. Uteri*, p. 20.) A. Elias von Siebold says he met with such a case. (*Handb. der Frauenzimmerkrankheiten*, ii., 355, Abschnitt 3.) The descent of the lining of the uterus at its os, described by B. Collomb as "Le renversement de la Membrane interne de la Matrice, et de son Orifice," but unconnected with pregnancy, may be named here. (*Œuvres Méd. Chir.*, p. 246.)

[164] See plate 1 of Part I. of this Essay, for the size of the inverted uterus at one month. Dr. Ramsbottom, at three weeks after delivery, found the inverted uterus, then first discovered, about the size of a goose's egg. (Dr. R. Lee's Lectures in *London Medical Gazette*, August 4, 1843, p. 661.)

absence of any aperture, fold, or irregularity, at the depth of the vagina, characterizes total inversion from partial, and also from a polypus, except in some rare and most uncommon instances, which, although they may with propriety be here specified, must be regarded as exceptions that do not nullify the general rule. I can offer no more impressive an example of error in diagnosis than the following, in which I participated with many others. Of the two specimens of chronic inversion so frequently referred to as having been found in the dissecting room by Professor Mackenzie, and represented in outline in the first part of this Essay, one was correctly denominated partial chronic inversion,[165] and has been further explained in a recent section; but the other,[166] although strongly resembling total inversion, and for a long series of years regarded and described as being so, I have discovered, on dissection of the preparation, to be no inversion at all, but a fibrous tumour, originating just within the cervix uteri, obliterating the os uteri in its gradual progress, and at length depending in the vagina, as a clapper in a bell; and by causing atrophy of the uterus, the polypus effected a shape and relative position of parts so entirely identical with chronic total inversion of the womb, as to render a correct diagnosis scarcely practicable.[167] There is evidence that this singular case had been regarded as uterine inversion during life, and attempts made to reduce it, leaving the effects of the forcible pressure employed for that purpose still observable in the specimen. From the atrophied state of the uterus, examination by the rectum would have confirmed the error, for no firm resisting uterus could have been felt in its proper place. Tumours arising from the os uteri have been represented as offering the same puzzling cases, and causing the erroneous belief of chronic total inversion being present.[168] It is,

[165] See outline figs. 9 and 11 of Part I., Section III., and plates 9 and 10 of Part II.

[166] See outline figs. 8 and 10 of Part I., Section III.

[167] See plates 13 and 14 of Part II., and description.

[168] Observation d'une Tumeur fongueuse du Col de l'Utérus, faisant saillie en dehors, et prise pour un renversement complet de la Matrice. (*Encyclographie Médicale, par Lartigue*, i., 385; from *Journal de Méd. Pratique de Bourdeaux.*) This tumour originated, as was ascertained on autopsy, from the entire circle covering the os tincæ, so that the neck of the tumour was this membrane, elongated and hollow. Diagnosis must, however, be considered practicable in such a case, unless, by the os uteri being closed, the organ itself becomes atrophied, as it can be felt per rectum. A fibrous polypus, originating at the cervix, so deforms and closes the

however, only such unusual growths at the os uteri that can lead to their being confounded with chronic total inversion, which may on all other occasions undoubtedly be diagnosed, if the shape and size of the tumour, with its texture, sensibility, and peculiar excretion at monthly periods, (all common to it and to *perversio extrema,* and about to be referred to fully,) be attentively considered.

By its more frequent occurrence, and the great bulk of relevant evidence scattered through the archives of our science, chronic uterine inversion, in the form of *perversio extrema,* claims the longest notice. The better the history of the disease itself, and of all those with which it may be confounded, is understood, the more easy and certain will be the diagnosis. Gross mistakes result from ignorance, inattention, too hasty conclusions, or a dull exercise of the mind in comparing the symptoms and ascertained facts of the case. Repeated investigations will often be needed, and can be made in all cases save where the patient, a silent sufferer, seeks relief only when, by pain and losses, her frame is emaciated, pallid, cachectic, dropsical; here, indeed, a decision must be speedily made, as time cannot be spared for several interviews, and the hæmorrhage and irritation, induced by persevering examinations, particularly at short intervals, may precipitate a fatal issue.

The commemorative or historical evidence should be carefully made out. Ocular information should also be obtained; and the speculum, so little applicable to recent inversion, comes greatly to our aid in the chronic stage. The florid or dull red colour of the membrane covering the tumour, the absence of all aperture at its depending part, the readiness with which bleeding occurs under the slightest touch, and particularly the flow of the menstrual discharge from the surface of the tumour itself, may all be demonstrated to the view.

The greatest variety of information, however, is to be gained by *the touch;* but when it is recollected that *this* varies one hundred

os uteri, that no bougie can be passed into its cavity; but here the tumour is one-sided, irregular, and not symmetrical like the inverted uterus. (See *Ranking's Half-Yearly Abstract of the Medical Sciences,* i., 140.) Speaking of the sound for exploring the uterine cavity for diagnosis, Busch and Moser observe,—"Es giebt jedoch eine Art von Polypen, welche rund an der innern fläche des Muttermundes sich ansetzen, und daher das Einführen eine Sonde ebenfalls nicht gestatten." (*Handb. der Geburtskunde,* ii., 451.)

fold in different individuals, according to their experience or acquirements, the same rules will in practice be found to produce very unequal results. The smooth, velvety covering, and the uniformly regular surface of the tumour, in chronic inversion, are recognized by the finger in the vagina. The size of the tumour,[169] as well as its shape, has to be ascertained in the same manner; and it must be recollected that in cases where there is no tension, no severe effects of morbid action, the inverted uterus may scarcely equal in size the healthy organ, and is flattened anteriorly and posteriorly, its greatest diameter being transverse. The largest part of the tumour is lowest, or towards the vulva, and it gradually, but very slightly, diminishes in size, presenting, therefore, a comparatively large neck at its highest part, where it is encircled by the uninverted cervix. If the tumour in the vagina be indolent and quiet, the cervix may be loose enough to allow the finger to pass within it to the depth of a third or half of an inch before it is obstructed; but where there is constriction, the elastic bougie[170] may be required to test the depth of this circular *cul-de-sac* formed by the cervix. Its depth will be found the same

[169] The usual size of chronic uterine inversion has been fully dwelt upon and demonstrated in Section III. of Part I. The following are by way of additional evidence:—Ramsbotham, at eleven months, found the tumour "about the size of a nonpareil apple." (*Obstet. Med. and Surg.*, note at p. 542.) Gooch, the size of a small apple, at nine months, and at the end of two years, of the same size. (*Dis. of Females*, p. 263.) According to Ferrand-Demissols, chronic inversion is smaller than the natural uterus. (*Thèse*, p. 25.) Meigs, at two years, found it not larger than the non-gravid womb. (*Midwifery*, second edition, p. 359.) It is very essential to regard the size of the neck of the inversion; it is never very small, but may be stated as rather large, in reference to the rest of the tumour. The transverse diameter may be from three-quarters of an inch to an inch and a quarter, and its circumference from three to four inches; any tumour with a neck of half these respective dimensions, either in transverse diameter or in circumference, may be pronounced to be polypus, and not uterine inversion. Herbiniaux (*loco cit.*, p. 62,) was fully aware of the usual small size of the inverted uterus in its chronic stage, and observed that, "If the tumour be so large as to distend the vagina and prevent your getting at the os uteri, it may be boldly pronounced polypus, and not a partial inversion, which is always of small size, and never fills the vagina."

[170] Copious and valuable remarks are given by Professor Simpson on the use of the uterine bougie in chronic inversion. "If the bougie passes two inches and a-half, or more, the disease is not inversion of the fundus; if the bougie cannot pass, at any point around the stem of the tumour, to a greater extent than about one inch, the uterine cavity may be considered as shortened by inversion." (*Lond. and Edinb. Month. Journal*, 1843, p. 55.)

in whatever part of the circle the bougie is passed,[171] and never, perhaps, so much as half an inch. The finger introduced *in ano* will discover the tumour previously examined by the vagina, and through the coats of the bowel the inequality marking the cervix may also be felt; but on passing the finger deeper up the bowel, no healthy uterus can be discovered. The absence of the uterus from its proper situation may be further proved by passing a male catheter into the bladder, and directing its end backwards, so as to approximate it to the finger in the rectum, when its end may be felt, with only the coats of the rectum and bladder intervening; but if the firm resisting uterus were there, the finger would gain no evidence of the end of the catheter.[172] Digital examination by the rectum should in no case, where any doubt remains, be neglected; and the practitioner who rashly decides without it commits an inexcusable error, and ought not to conclude that the case which he has erred in, or felt hesitation about, did not admit of a correct diagnosis.[173] An additional method of investigation has lately been suggested by Malgaigne.[174] He introduces a male catheter into the bladder, and directs its end backwards and downwards, so that, carrying the coats of the bladder before it, it may

[171] In Dr. Charles Johnson's fifth case, the narrator, Dr. M'Clintock, says the only satisfactory ground of diagnosis was the examination with the bougie. "Upon a vaginal examination, a globular tumour was readily felt, round which the finger could be freely carried, and encircling the upper portion, (which was smaller in circumference than the part below,) the os uteri was plainly perceptible. When a catheter was passed up between the os and what may be called the neck of the tumour, it was very soon completely arrested, and this was found to take place, no matter at what point in the whole circumference the instrument was pushed up." (*Dublin Med. Journal*, xxvii., 44.)

[172] This method of investigation is described by numerous authors; amongst them we see Busch and Moser, *Handb. der Geburtskunde*, ii., 452; also Moser, *Lehrb. der Geschlechtskrankheiten des Weibes*, s. 199., and A. Elias von Siebold, *Handb. der Frauenzimmerkrankheiten*, ii., 361, Abschnitt 3.

[173] In Mr. Bloxam's case of removal of the uterus, the ligature was first applied under the belief of its being a polypus, and although it is not stated that any examination had been made by the rectum, or with the bougie, the author considered that all the diagnostic symptoms were such as justified his opinion. As to all the rest, the history given by Mr. Bloxam is most excellent, and worthy of attentive perusal. (*Johnson's Med. Chir. Review*, xxvi., 169.)

[174] See *Thèse des Polypes Utérins*, p. 36. Dupuytren observes,—"C'est à l'expérience à prononcer sur ce nouveau moyen." (*Leçon's Orales*, iii., 536.) Lisfranc sets small value on this new proposal, because polypi are sometimes hollow, and because sometimes the peritoneal cul-de-sac of an inversion cannot be entered

enter the peritoneal cul-de-sac formed by the inversion, and become evident to the finger in the vagina through the coats of the inverted organ. If evidence can thus be gained it is decisive; but hitherto no surgeon has, so far as I know, pronounced favourably upon the proposal from his own experience. It is said that, in an emaciated patient, the absence of the uterus may be ascertained by examining through the abdominal parietes above the pubes, and even the circle and hollow leading to the inversion be discovered; but however effectually the suspected tumour may be pressed up by the fingers in the vagina, it will require a very highly cultivated tact to arrive at such conclusions.[175] Still, examination by the hypogastrium is not to be neglected, as the uterus, if *in situ*, (the bladder being empty,) may, in all but the corpulent, be felt in this way, proving the absence of inversion.

Such remarks as remain to be made will, perhaps, be best elicited in contrasting chronic partial inversion with an uterine polypus occupying the vagina. These are the most frequent maladies which have been confounded together, or reciprocally mistaken the one for the other. The actual size, which is to be ascertained by tactile examination, will aid us greatly in the very outset; the chronic inversion presents in general a tumour as small as the healthy uterus; if the tumour, therefore, be of large size, and have never prolapsed externally, a polypus is indicated, and the many examples[176] of very large tumours being regarded as inversions show how little attention was paid to the subject. The varying size of the tumour, under examinations made at distant intervals, may give assistance. The inverted uterus, however different in shape in different patients, varies little in size; if inflamed from

by the end of the catheter, owing to adhesions. In the latter case an inversion might be taken for a polypus. On the former point Lisfranc's remark is without force, as we have no evidence that hollow polypi communicate with the peritoneal cavity. (*Clin. Chir.*, iii., 137, 389.) Professor Simpson doubts the applicability of Malgaigne's method, after having repeatedly tried the experiment upon the dead subject. (*Lond. and Edinb. Monthly Journal*, 1843, p. 53.)

[175] See Baudelocque at the conclusion of note 75 of Part I of this Essay; also Velpeau, *Clinique Chir.*, ii., 421.

[176] Gooch gives a case, to which the late Dr. Rigby was called, and where a tumour externally prolapsed, weighing 3lbs. 15oz., was supposed to be an inversion of the womb. (*Dis. of Females*, p. 274.) Hoin has a similar account; the tumour weighed 12lbs. (Ferrand-Demissols, p. 26.) Attempts were in vain made to reduce a large fibrous tumour, presenting beyond the external labia, and regarded as the

persevering examinations, or congested by a firmly constricted cervix, it increases in size for a time, and at the period of menstruation there is some enlargement of the tumour, as well as a softening of its covering; but there is no regular growth,[177] such as a polypus will generally exhibit. If growth be ascertained, it proves a polypus. A lively recollection of what has already, in the course of this Essay, been represented, or described, as to the shape, size, and texture of chronic uterine inversion, coupled with a knowledge, by experience, of the properties of the different sorts of polypi, will often suggest a correct opinion of the case at a first examination.[178]

inverted womb. (R. Lee, in *Lond. Med. Gaz.*, p. 659, Aug. 4, 1843.) Such histories go no way towards proving diagnosis to be impracticable, but only that it is difficult to get correct and good rules observed and attended to in practice. To avoid error, let the surgeon think *first* of uterine inversion, (instead of allowing this to be the last idea that occurs to him,) and seek to remove any degree of doubt by applying strictly the rules for diagnosis.

[177] The tumour had not increased during six years, so unlike a polypus, which usually grows quickly after it has passed the cervix uteri. (Rust, *Handb. der Chir.*, x., 174.) There are examples of the chronically inverted womb, if not prolapsed, being found of the usually small size at the expiration of ten, fifteen, or twenty years.

[178] The diagnosis between polypus and inversion of the womb, reciprocally, is noticed by most systematic writers, but the following authors may be referred to as having treated very fully on the diagnosis of uterine inversion generally and most effectively; they are placed in chronological order:—Deleurye, *Theses*, p. 97; Levret, *Mém. de l'Acad. Chir.*, iii., 469; Dailliez, *Thèse*, p. 76; Lefaucheux, *Des Tumeurs*, p. 178; W. G. von Herder, *Beiträge*, s. 121, 130; Fries, *Adhandlung von der Umkehrung*, s. 77, 94; Newnham, *Essay*, p. 53; Meissner, *Disloc. der Gebärm., Theil* 3, s. 58; A. E. von Siebold, *Handb. der Frauenzimmerkrankh.*, ii., Abschnitt 3, s. 361; Ferrand-Demissols, *Thèse*, p. 27; Malgaigne, *Thèse* p. 27; Busch and Moser, *Handb.*, ii., 451; Lisfranc, *Clin. Chir.*, iii., 109, 135, 140; Velpeau, *Prov. Med. Journal*, vi., 61, and *Gazette des Hôpitaux*, vi., 413; Oldham, *Guy's Hosp. Reports*, new series, No. 3, p. 105; Lessing, *Chir. Diagnostik*, ii., 142. Inversion and polypus have been interchangeably mistaken. The following references point to the more serious error of the two, inversio uteri treated for a polypus:—Petit's case, *Dict. des Sc. Méd.*, xlvii., 480; Martin-le-jeune, *Mém. de Méd. et Chir.*, p. 213; R. Lee, *Lect. on Midw.*, p. 428; Dr. W. Hunter, in Gooch, *Dis. of Women*, p. 274; Kilian, *Oper. der Geburtshülfen*, i., 130; Lauverjat, in Dailliez, *Thèse*, p. 72; Newnham, *Essay*, p. 31, *Dublin Hosp. Reports*, iii., p. 487; Hauck, *Summarium der Medicin*, i., 120. In each of these instances a ligature was applied for the removal of the part, and with a fatal result in the first four. Velpeau, after having had more experience than most men, and after stating that "none but the grossest ignorance could confound an inversion of the womb with polypus," (*Midwifery*, translated by Meigs, p. 591,) made this mistake:—he was called upon to operate for

Too much reliance must not be placed upon the sensibility, or insensibility, of the tumour under investigation; if it readily inflame and become painfully sensible to pressure from examination, it will surely prove to be an inverted uterus. Upon the value of the sensible test in diagnosis the testimony of the most experienced is variable.[179] Generally it may be stated that an inversion is more or less sensible, and polypus not sensible; a vesicular polypus

a polypus uteri, (for such all who had examined the patient considered it,) and under this idea he proceeded; but the woman suffered so much from pain that the mistake was discovered. Severe nervous symptoms ensued; these subsided by degrees, and at length the patient recovered, and never knew that more than that the removal of a polypus had been effected, wondering that no menses returned. (*Gazette des Hôpitaux*, Septembre 5, 1844, vi., 413.) Well might Velpeau add,—"Je sais trop bien qu'il est des cas dans lesquels le doute est la seule opinion rationnelle." (*Leçons Orales de Clin. Chir.*, ii., 425.)—The less dangerous error, a polypus mistaken for inversion, has been repeatedly recorded, viz.,—Levret, *Mém. de l'Acad. de Chir.*, iii., 463, (it was a polypus, prolapsed at labia, and weighing thirty ounces!) *Mem. of the Med. Soc. of London*, v.. 17; J. Ramsbotham's *Obs. in Midwifery*, ii., 473; Lindley, in the *Lancet*, for June, 1842, p. 445; *Ranking's Abstract of the Med. Sc.*, i., 140, and *London and Ed. Monthly Journal*, for April, 1845.

[179] Much has been stated upon this symptom in Section III., note 77 of Part I., and in Section IX., note 72 of Part II. of this Essay; but, at the risk of repetition, I will add a few more references. Velpeau regards sensibility as of high importance in the diagnosis of uterine inversion from polypus. (*Gazette des Hôpitaux*, vi., 413.) Many writers designate sensibility as quite pathognomic of inversion. (Langenbeck, *Chir. Krankh.*, v., 177; Dr. D. D. Davis, *Obstet. Med.*, p. 624.) The varying sensibility of the inverted womb is the source of obscurity. Dr. Belcomb, at twelve weeks, says—"The pain experienced on pressure was excruciating;" but the inverted fundus was greatly constricted by the cervix. (*London Medical Gazette*, vii., 784.) Dr. Symonds found the tumour "insensible when pressed upon or irritated by the points of the fingers." (*Ibid.*, p. 242.) Windsor observed the vagina to be more sensible than the inverted uterus. (*Trans. of Med. Chir. Society*, x., 365.) Lisfranc remarks, that fibrous polypi have no nerves:—"Point de nerfs dans le tissu fibreux accidentel." (*Clin. Chir.* iii. 8.) The same may be said of all polypi, which can only present sensibility by their exterior covering, being the lining membrane or other texture of the uterus. "Le polype est indolent, à moins que sa membrane d'enveloppe ne soit frappée de l'inflammation, tandis que la matrice jouit d'une certaine sensibilité." (Dupuytren, *Leçons Orales*, iii., 534.) Oldham supports the sensibility of a fibrous polypus. (*Sach's Leistungen der Heilkunde*, 1837, ii., 265; from *London Medical and Surgical Journal.*) A. E. von Siebold found one exception to a polypus being insensible. (*Handb. der Frauenzimmerkrankheiten*, ii., 363.) In Dr. C. Johnson's fifth case, it is shown how little aid to diagnosis is sometimes derivable from the sensibility of the part examined:—"When the tnmour was gently handled, no complaint was made, nor, indeed, did she seem conscious of what was done; but if rudely pressed, some uneasiness was produced, and the small of the back referred to as its seat." (*Lancet*, July 19, 1845, p. 74; and *Dublin Journal of Medical Sciences*, xxvii., 45.)

has no sensibility, and does not inflame; but it may be otherwise with a fibrous polypus covered with the healthy and unaltered lining membrane of the uterus. It will not be always easy to determine whether the pain or sensation awakened be in the tumour or the neighbouring parts,[180] and the excited state of the patient's mind may mislead you. Rely not upon one sign, or one method of investigation, but conjoin several. The introduction of the bougie as a probe, so forcibly pointed out by Professor Simpson,[181] may be considered indispensable. In all ordinary cases where a polypus of moderate size, such as may simulate an inversion, occupies the vagina, examining by the rectum and above the pubes may afford evidence of the body and fundus of the uterus being *in situ*, and all doubt be thus dispelled.

The inverted uterus, when become chronic, is always hard and dense in its texture, like the organ in its normal state; even when the surface is soft and spongy you feel the deeper parts of the mass to be dense and firm; but polypi vary much in texture, some being soft and light,—the vesicular; others dense, hard, heavy, and even nodulated.[182] The inverted uterus again is symmetrical; not often so the polypus, particularly the fibrous, the division of

[180] The great source of difficulty in rendering the sensibility of the tumour under examination available in diagnosis is, the uncertainty as to its presence or absence. "This can never be an accurate mode of forming a diagnosis, as we can only judge of the sensibility of the tumour by the expressions of the patient, which are regulated more by disposition than by the extent of her sufferings. I lately attended a lady with uterine polypus, and had I judged solely by the complaints of my patient, I should have pronounced the polypus to have been more sensible than an inverted uterus usually is." (Dr. C. Johnson, in *Dublin Hospital Reports*, iii., 488.) Most has observed, that pressing a polypus back, as if to return it into the uterus, always causes pain," (*Encyclopädie der Med. und Chir.*, ii., 691;) if the os uteri be irritated and inflamed, how much must this pain be increased! "We shall always find it difficult to distinguish between the sensibility of the tumour and sensation occurring in the neighbouring viscera, which are irritated by the process of examination; while, too, it must be remembered that the sensibility of the inverted uterus is greatly diminished in its chronic stage, and that the sensibility of polypus may be increased by the presence of inflammatory action." (Newnham, *Essay*, p. 83.)

[181] The uterine metallic sound is now prepared graduated, so as to render the measurements of the cavity of the womb easily ascertainable, and is likely to come into general use. Certainly no surgeon, who attempts to diagnose the displacements and deformities of the uterus, should be without the sound.

[182] Herbiniaux calls the inverted uterus *hard*, distinguishing it from polypi; others represent it to be *soft*. (Malgaigne, p. 35.) Where comparative language is thus used, without any definite point to start from, no advantage is gained by what an author states. (Lisfranc, *Clin. Chir.*, iii., 135.)

which by a mesial section would, in many cases, not make two equal and corresponding parts; hence, a want of symmetry in the tumour indicates a polypus, although its presence does not prove an inversion of the womb.

An inversion in the chronic stage, when all inflammation of the tumour and all constriction by the cervix are absent, possesses a degree of mobility under digital examination, but cannot be turned on its axis, for its neck is still comparatively large; a vesicular polypus with a narrow neck has more movement, and can even be turned a little on its axis. The fibrous polypus, with a large attachment, may be more fixed than even the inverted uterus.

Ocular evidence of the menstrual fluid oozing[183] from the surface of the tumour may be set down as pathognomonic, distinguishing uterine inversion from all other maladies with which it has hitherto been confounded. The feeling of the stretched round ligaments within the tumour, and pain being produced in the groins on lowering the tumour a little so as to render the tension greater, may be placed in this category.

When the chronically inverted uterus prolapses, as frequently it does, the diagnosis must be regarded as less difficult; but it has been often mistaken for a direct prolapse of the uterus, and treated by the pessary. The distinctions are, that the latter is tapering at its lower or depending end, and has an aperture leading into the uterine cavity; and the inverted vagina, which covers the whole of the uterus, presents a sensible surface, not apt to bleed, and having a less florid and vascular hue than the inverted womb.[184]

[183] The appearance of the menstrual exudation, as observed upon the surface of the inverted womb, has been described by several authors, and in very similar terms; the fluid oozes out at numerous distinct points, and increases until these coalesce and give a general covering to the entire mucous surface. (Boyer, *Mal. Chir.*, x., 490; M'Clintock, *Dublin Journal of Medical Science*, xxvii., 45; Ferrand-Demissols, *Thèse*, p. 28.) Pulsation felt in the tumour has been regarded as characteristic; but the same sign has been repeatedly observed in a polypus. When tactile examination irritates the tumour, and produces increased heat of it, inversion is indicated; a polypus does not take on the same morbid and increased action from repeated examinatiöns. "It has been suggested that the discovery of *plicæ*, or small wrinkles in the mucous membrane where the uterus turns upon itself, characterizes an inversion." (Dr. W. Merriman, in *Lond. Med. Gazette*, December 18, 1846, xxxviii., 1080.)

[184] "Prolapsus non est cruentus, sed glaber, siccus, aut mucosus et serosus. Inversio plus aut minus sanguine obducta apparet. In prolapsu autem, tum sanguis se ostendere potest, si menstruationis tempus adest; hic autem guttatim tantummodo

Repeated internal prolapse of the inverted womb, by causing irritation and thickening, at length renders the tumour of much larger size than I have described;[185] also preternatural thickening, and growths, vascular, fungoid, or scirrhous, may be conjoined with chronic inversion. These cases are, however, most rare, as the fundus under inversion seems little liable to such diseases, which are known to occur mostly at the os and cervix, the parts most exposed to the irritating causes in general, but retired and protected when there is an inversion. To name these extreme complications is sufficient; all cannot be minutely referred to with advantage, and the surgeon who has possessed himself with the general rules will be pretty well prepared to grapple with the exceptions. In some difficult cases very bold measures have been perpetrated for diagnosis.[186] It may be allowable to pull down a tumour projecting at the os for ascertaining its nature, as Lisfranc advises; but to cut into a questionable tumour for the same purpose, as Dupuytren has done, seems scarcely admissible in the present refined and improved state of our art.

Upon the obscure subject of hollow polypi, met with by some authors, and represented as creating great difficulty in diagnosis,

profluit ex orificio uteri." (Herzog, *Diss. de Inv. Uteri*, p. 12.) Inversion taken for polypus, and repeatedly returned into the vagina and treated by pessaries. (*Ibid.*, p. 23.) Inversion taken for procidentia uteri. (M'Clintock in *Dublin Medical Journal*, xxvii., 45.) In the *Musée Dupuytren*, at Paris, there is a preparation, considered to be inversion of the uterus, but of a conical shape, and so like direct prolapse that nothing less than a section could solve the question about it; the urinary bladder is laid open, showing a calculus.

[185] What I have so strongly represented, in regard to the small size of the chronically inverted womb, must be accepted with the following qualifications:—That by frequent prolapse and attacks of irritation and inflammation, the part may increase much in size, by deposition into its textures;" except under these circumstances, the inversion is usually of small and definite dimensions, so long as it is not combined with polypus or other morbid growths.

[186] A surgeon, finding a tumour at the os uteri, presenting evident fluctuation, punctured it with a trocar to empty it, but nothing escaped; it was a polypus. (Malgaigne, *Thèse des Polypes Utérins*, p. 30.) Dupuytren thought he had to do with an inverted uterus; he made an incision into the tumour, and corrected his opinion, as he found *no cavity*. "What would he have done," asks Malgaigne, "if he had found one?" (*Ibid.*, p. 30.) Lisfranc made an explorative incision, and enucleated a certain tumour situated at the os, about which he doubted whether it were polypus or inversion. (*Clin. Chir.*, iii., 109.) If such proceedings are to be sanctioned, it should only be under great difficulties, and after all other means of diagnosis have failed.

I know nothing, and can only refer to the authorities.[187] The most remarkable case is represented and described by Boivin and Dugès;[188] it was removed by Dubois, and the drawing, in size, appearance, and outline, resembles so strongly a recent inversion of the uterus, that no one looks at it without exclaiming "there is the peritoneal pouch of the inverted uterus, the openings of the Fallopian tubes, and the walls of the organ, of the thickness, structure, shape, and appearance which might be expected!" But how can we mistrust such authorities, when we are assured that the uterus was ascertained to be quite perfect on examining the

[187] The first case of hollow polypus was described by Saviard, (*Obs. in Surgery*, translated by Sparrow; Obs. 36, p. 82;) it was a fleshy substance, the size of a bullock's heart, adhering to the fundus uteri, and found on autopsy; four veins and four arteries nourished it, the former being as large as the crural veins; a considerable cavity was found in the middle of it. The woman was supposed to be eleven months gone in pregnancy. The mass was contused and gangrened by the frequent endeavours of the midwife and accoucheur to extract it, and which attempts, no doubt, caused the death of the patient. Ruysch removed a large polypus, which he at first took for an inversion of the uterus—"Substantia enim mentiebatur uterum;" but he found the uterus in place, and adds, "dictus tumor nil sit quam tumor carnosus, seu sarcoma, variis locis cellulis aquosis repletus, et ex confinio oris uteri emersus." (*Thesaurus Anat.*, viii., No. 102, p. 55.) Boudon's specimen, as noted by Levret, (*Mem. de l'Acad. de Chir.*, iii., 466, 8vo. edition,) belongs here:—"Cette tumeur formait une espèce de poche, tissue de fibres charnues dans toute son étendue, et que l'intérieur de sa cavité étoit parsemée de rides longitudinales qui se terminoient à la partie qu'on pouvoit en regarder comme l'orifice." Lisfranc (*Clin. Chir.*, iii., 64,) mentions Dupuytren as having met with "ce beau fait d'anatomie pathologique," original cavities in a polypus; but I only find this renowned surgeon quoting the case at *l'Hôpital St. Louis*, in which a tumour for many years had prolapsed at the labia, and on being removed was found to present a cavity in its centre, and in other respects so closely resembling the uterus itself, that Richerand and Cloquet believed they had amputated this organ; but the patient died, and the autopsy revealed the uterus entire and *in situ*. (Dupuytren, *Leçons Orales de Clin. Chir.*, iii., 475; also Velpeau, *Méd. Operatoire*, iv., 383, 2ème ed.; Lefaucheux, *Diss. des Tumeurs de la Matrice*, p. 7; Malgaigne, *Thèse des Polypes Utérines*, p. 11.) The inference of Ferrand-Demissols, from these accounts of hollow polypi, is that a feeling of a cavity within the tumour, supposed to be characteristic of uterine inversion, "est un signe trompeur," a symptom not to be relied upon. (*Thèse*, p. 27.)

[188] See plate xix., figs. 3 and 4, of Boivin and Dugès, on *Dis. of the Uterus*, by Heming. The tumour, successfully removed, "is so like the uterus, in consequence of the cavity in its centre, that it might deceive an incautious observer; and yet we have ascertained that the uterus of the patient is quite perfect;" p. 130. Cruveilhier gives an authentic account of a polypus identically of the same structure as the uterus itself, and proceeding from its fundus, making a very puzzling case. (*Anat. Pathologique*, tom. ii., pl. 6, figs. 1, 2, 3.)

patient afterwards, whilst the hollow tumour thus removed during life is still preserved and open to inspection?

The occurrence of inversion of the womb in a miscarriage, of which so clear an instance[189] has been recorded lately in this country, should lead the accoucheur to remember the possibility of such an event; no additional rules are applicable to the case, beyond what have been already described, and the smaller size of the parts will facilitate the tactile examination, particularly by the rectum, and propitiate a correct diagnosis, if the operator be well instructed and properly awake to suspicion.

It would scarcely seem possible to mistake a descent of the womb for its inversion; with the least attention such could not happen in regard to partial inversion; the organ in descent is conical, with the base upwards, and the smaller end downwards, at which latter is a transverse aperture, from which the menses escape; the covering of the tumour is uninterruptedly continuous with the vagina, and is, indeed, the vagina drawn down and inverted. If ever this be confounded, it must be with total inversion, which is always pyriform, and its imperforated base presenting within the labia. In direct uterine prolapse, the tumour is the same in shape as above described, and the part of the vagina covering the uterus, being exposed to the air, is dry, and resembles the outward skin, whilst the cavity of the vagina is greatly shortened, or nearly obliterated. The presence of an aperture at the lowest part is characteristic of prolapse, and so is the escape of the menses, if it flow from this aperture; whereas in inversion it will escape from the covering of the tumour. Direct prolapse of the uterus cannot be confounded with inversion, if deliberate investigation be made in conformity with the methods propounded by every practical author; but so little is uterine inversion thought of, that when you mention its prolapsing at the external labia, nine-tenths of the practitioners have no other idea than that of direct prolapse of the organ covered by the inverted vagina. At no time does prolapse only cause the depressing and formidable symptoms, nor the interruption to health by those repeated losses, mucous or sanguineous, which are the constant attendants upon inversion of the womb.

Upon the displacement of the bladder, in consequence of uterine

[189] See note 147 of Section X. of this Essay.

inversion, a subject already referred to,[190] it has been shown that such a change is less frequent than authors have represented, and accompanies only the extremest degree of prolapse of the inverted womb. But the bladder, when retroverted and descending externally at the labia, has been thought to be the inverted uterus. We have not only to notice those mistakes which may be likely to arise, and are with difficulty avoided, but such as the greatest blunderers have made, and which might easily be avoided. It is only by neglecting all accurate investigations, either by the vagina or the rectum, that prolapse of the bladder can be confounded with the malady I am considering; the bladder, distended with urine, is yielding and soft in texture, and pressing it firmly causes diminution of bulk by the urine escaping per urethram; the inverted uterus, on the contrary, would be firm and resisting; it would not vary in size, and there would be an impossibility of finding the uterus behind it, on examining by the rectum.[191]

It remains to speak of inversion of the womb, produced and accompanied by polypus, and unconnected with pregnancy or parturition. Inversion from that cause cannot happen, I believe, so long as the polypus remains wholly *in utero*, and particularly if the *os tincæ* be contracted; but this opening being dilated, and the polypus partly or chiefly propelled into the vagina, *depressio* or *introversio* may be the result, and a corresponding deformity will

[190] See Section III., notes 62, 92, 94, of Part I.; also Section VIII., notes 60, 62, of Part II. Some authors have considered a displacement of the bladder as accompanying every considerable degree of uterine inversion, and inevitable when there is prolapse; but a perusal of the passages above referred to, will show how little evidence there is to this effect, and how unfounded the rule for diagnosis laid down by Levret, (see Hoin's case, in *Mém. de l'Acad. de Chir.*, iii., 466, 8vo. edition,) when on learning that, on the introduction of a catheter, where a large tumour prolapsed at the external labia, the bladder was found *in situ*, he concluded thereupon that it was a polypus! Retroversion with descent, and even with external prolapse, of the bladder, is not a very rare occurrence in females who have had many children; and where this displacement has preceded, a prolapsed inversion of the uterus will, perhaps, necessarily bring down the bladder; but in other cases, and even when the inversion is carried to the greatest degree of prolapse, I feel assured that the bladder may still remain *in situ*, as represented in outline figure 5 of Section II., Part I. of this Essay. Again, examine the evidence furnished by outline figs. 13 and 19, and plate 8, of Part I.; and observe H. von Sanden's case, (outline figure 13 of Part I. of this Essay,) where it was found on autopsy that the bladder remained in its proper place, behind and above the symphysis pubis.

[191] See Ferrand-Demissols, *Thèse*, p. 18, and Thouret, *Thèse*, p. 10.

be ascertainable at the fundus uteri on examining by the rectum, though probably not by a hypogastric examination. If the polypus be small enough, and the os tincæ dilated enough, the finger may enter the uterus and feel its inverted fundus of a conical shape, with the apex downwards, forming the neck of the polypus. This hour-glass shape, where an isthmus unites the apices of two cones, can with readiness be ascertained when the inversion is carried to the degree of *perversio*, and the nature of this compound malady will be more and more readily ascertainable as the polypus prolapses, bringing with it, and further inverting, the uterus. The process may go on till there is total inversion of both uterus and vagina. A review of what has been stated previously, and an inspection of the outlines and plates, will suggest the distinctive points of the disease, in regard to the shape and displacement of parts;[192] but there are some remarkable properties which must be otherwise ascertained. The insensibility of the polypus (for insensible it generally is,) is ascertainable as high as the cervix or isthmus, where, the uterus becoming concerned, sensibility is evident in all the upper tumour, under pressure upon, and irritation of, the surface. The degree to which the fundus uteri is displaced may be judged of by the use of the bougie as a sound, which, introduced within the os, will stop at the angle of reflexion. As it is of consequence to know if there be inversion only, or a polypus conjoined with inversion, the bougie may be employed to elucidate this point. By it we ascertain, first, the depth of the uterine cavity from the os to the limit of the cul-de-sac within, and next the length to which the tumour projects through the os uteri into the vagina; if the latter measurement, added to twice that of the former, be only equal to the healthy uterus, two inches and a half, it must be inversion only; but a polypus complicates the inversion if the measurements much exceed the above, and the excess will indicate the extent of the polypus.[193]

[192] See outline figs. 13, 17, 18, 19, of Section IV., and plate 8 of Part I. of this Essay. I have omitted elsewhere to observe that Rheineck, in his case of malignant polypus complicating uterine inversion, observes that, on a vaginal examination, he felt either the round ligaments or a Fallopian tube. (*Siebold's Journal für Gebürtshülfe*, v., 630.) Observing the terminating orifices of the Fallopian tubes upon the surface of a suspected tumour has been named, and of course, if detected, these would be pathognomic of inversion.

[193] "The length of the whole interior of the uterus, as made up by the double measurement—first, of the depth of the cul-de-sac of the cervix, and, secondly, of

A perusal of the rules laid down by the best authorities, and embodied in the preceding pages with some additions, cannot fail to assist the diagnosis of uterine inversion in all its complications and varieties, and to render less frequent than heretofore the dangerous, and even fatal errors, with which our records abound. Do what you will, errors will still occur, partly from the rarity of the disease, and partly from the unprepared state of the practitioner. It may not be possible, in reference to every form and variety of a complicated malady, to convey so clear an account of the methods of diagnosis as shall meet the capacities of the inexperienced, or obviate the mistakes of the careless and slow observer; but it ought to be a maxim, that uterine inversion is ascertainable in all, save a very few and extraordinary anomalous cases, provided the surgeon be well informed, give sufficient attention and deliberation, and exercise his faculties with energy, keeping in ready recollection the different maladies and conditions which require to be distinguished from the one now especially under consideration.

SECTION XII.

ON THE PROGNOSIS IN CASES OF INVERSION OF THE WOMB.

Very justly has this displacement been characterized by Weber "*malum ingens periculique plenum.*" In the whole catalogue of maladies of the same class there will be found none more fatal than uterine inversion,—none depending so much, for a favourable result, upon the immediate attendance and efficient aid of the surgeon. The mortality has been variously estimated by several authors, without any reference being stated to the grounds on which their calculations were made, or the sources whence their information was derived. The result of my own inquiries seems to

the inverted portion from the roof of this cul-de-sac to the apex of the inverted tumour—may afford us more positive information. When added together, the two measurements will, in a case of simple inversio uteri, not exceed much, if at all, the normal length of the cavity of the organ; in a case of inversion complicated with polypus, they will exceed this standard in a ratio proportioned to the size of the polypus and the probable elongation of the uterine tissues which it has produced." (*London and Edinburgh Monthly Journal*, 1843, p. 55.)

prove that the proportion of fatal cases has generally not been overrated. I can affirm, upon by far the most extensive *data* which have yet been furnished, that above one-third of all the cases of uterine inversion,[194] under whatever circumstances, or in whatever degree they occur, prove fatal either very soon, or within one month after the displacement is produced.

Restricting the calculation to cases of uterine inversion *post partum*, and excluding all those examples where an operation has been subsequently performed for the removal of the inverted organ, I find that *one hundred and nine* fatal cases, collected from various authentic sources, supply the following results :—

Seventy-two, or two-thirds, proved fatal within a few hours, most of them within half an hour or an hour, even before a consultant arrived, and sometimes so rapidly as to preclude the ordinary attendant from making any attempts at replacement; others died during, or immediately after, such attempts. An accoucheur went down stairs to give tidings that the delivery was accomplished and all favourable, and on his returning to the *chambre de travail* the patient was dead! The uterus was found inverted and prolapsed.[195] In *five* cases only out of these *seventy-two* was the fatal issue deferred beyond four hours after delivery.

Eight cases out of the *one hundred and nine* proved fatal in from one to seven days, and *six* in from one to four weeks. It deserves

[194] My statistical notes of uterine inversion *post partum*, derived from reading, correspondence, or my own experience, consist:—1. Of cases where the inverted organ has been torn away wrongfully, or removed by operation. 2. Of all other cases of inversion of the uterus after delivery. This latter class amounts to 281 authenticated cases, of which only 132 are stated and known to have recovered after proper replacement, whilst forty passed unreduced into the chronic stage, leaving the final result generally in obscurity, and 109 proved fatal at different periods, as stated in the text. Meissner says, where the inversion is forcibly produced and carried to the extreme degree, at most only one in twenty-five is saved, or one in ten or twelve if replacement be immediately effected; in partial inversion, one-third live after reduction; but where reduction is not accomplished, by far the greater portion succumb sooner or later from the malady. (*Dislocationen der Gebärmutter, Theil* 3, s. 72.) Busch and Moser observe, that when the inversion happens rapidly, indicating strong predisposition, or great atony of the uterus, if reposition be not immediately effected, not above one in thirty or forty is saved! and even where reduction is accomplished, one-fourth die from the effects of the injury. (*Handb. der Geburtskunde*, ii., 433.) "How vastly do the fatal instances preponderate, and how greatly would this be augmented, could the blunders of ignorant practitioners, which have been quietly consigned to the grave, be fully revealed." (Newnham, *Essay*, p. 95.)

[195] Hurd, in *London Medical Gazette*, xxv., 837.

to be forcibly noted that, although eighty-six cases were thus brought to a close within *the month, this period* being passed, only *one*[196] of the remaining twenty-three proved fatal before arriving at the chronic stage, showing the little danger to life during the subsequent four or five months, should the patient have escaped the first month's ordeal. But the danger recommences at eight or nine months,[197] when the suckling period has terminated and the menstrual begun; for I find that the remaining *twenty-two* cases terminated fatally at different dates, extending to three or four years, and, in a rare instance or two, to five, or even to *twenty* years.

The uterus may be relaxed and easily reducible, when the surgeon is summoned at the moment to witness an external prolapse of the inverted organ, but it may prove one of the worst cases. The facility of reduction is owing to the patient being in *articulo,* and instead of its availing, death speedily follows. If the organ, on being reduced, do not contract, but the cervix remain very expanded, yielding and relaxed, a relapse of the displacement, or a fatal issue, may be expected. The less the degree of the inversion, and the slower it advances, the smaller may we consider the danger to be.

The predisposing causes to inversion, and particularly the constitutional state of the patient, have great influence upon the prognosis. When the displacement takes place rapidly, the fundus and also the body of the uterus passing through the os, and even prolapsing under expulsive abdominal efforts, and in an atonic state of the organ, the symptoms are developed in an alarming

[196] This is M. A. Petit's case, where a ligature was temporarily applied in error, at five months, and death ensued in a few days; without such interference, the fatal issue might, at least, have been deferred. (*Annales Clin. de Montpellier*, 1815; Murat, *Dict. des Sc. Méd.*, xlvii., 479; Velpeau, *Clin. Chir.*, ii., 423.)

[197] The following are references to a majority of these *twenty-two* cases, which went on to the chronic stage, but proved fatal:—One at eight months, (Mauriceau, ii., 294; *Obs*, 355;) three at nine months, (Fries, s. 33; Ingleby, as in plate 7 of Part I. of this Essay; M'Clintock, *Dublin Medical Journal*, May, 1845;) one at twelve months; (Peu, *Prat. des. Accouchemens*, p. 604;) two at twenty-two months, (Baysellance, as in plate 5 of Part I. of this Essay; Dailliez, *Obs.*, 23, p. 72;) one at about two years, (Martin-le-jeune, p. 220;) one at three years, (Harvie, p. 28;) two at about four years, (Windsor, in *Med. Chir. Trans.*, x. 359; Velpeau, *Clin. Chir.*, ii., 427;) one at five years, (*Schmucker, Verm. Chir. Schrift.*, ii., 143;) one at twenty years, (King, *Glasgow Medical Journal*, i., 72.)

degree, and death quickly follows. On the other hand, the prospect is favourable where the inversion stops in an early stage for a time, and subsequently advances. Such examples as occur spontaneously are often more threatening, unless most promptly attended to, than where traction by the funis has been the principal efficient cause. These, indeed, if the violence inflicted be not great, evade better and go on to the chronic stage, if unreduced, because the patient may possess the advantage of a strong constitution.

Amongst the causes of a speedily fatal result in recent inversion, the most powerful and most frequent is undoubtedly hæmorrhage. If *depressio* fail either to be rectified, or to pass into a more advanced degree of inversion, it causes death by hæmorrhage; and where death happens within a few hours under *perversio extrema* with prolapse, the same cause may be very often assigned for the fatal result; but in the latter case there is always superadded a severe shock to the nervous system, proceeding to convulsions, syncope, and extinction of the pulse.

In the entire range of surgical practice there is no case more urgent. "Festinare oportet, si enim uterus non protinus reponitur, fæmina non raro repentina et inopinata morte rapitur."[198] The most immediate attempts at reduction are most likely to be crowned with the greatest success. One of the earliest writers[199] observed that, if two hours have elapsed the inversion cannot be reduced. Denman,[200] a century afterwards, relying upon his own experience, came nearly to the same conclusion; and many who have followed him,[201] give an opinion almost as unfavourable, as to the chance of reduction. Some allow that four or five hours may elapse and yet this object be with certainty effected.[202] As a general rule it may be stated that you can only expect success by attempting the reduction within the first few hours; and the cases in which replacement has been achieved after days or weeks have elapsed may be placed amongst the exceptions. The rule, as thus

[198] Hiltebrandt, *Institutiones Chirurgicæ, Mosquæ*, 1829, p. 382.

[199] Peu, *La Pratique des Accouchemens*, Paris, 1694, p. 603.

[200] *Practice of Midwifery*, fifth edition, 4to., p. 539.

[201] Deleurye, after enumerating the formidable symptoms that attend inversion in the extreme degree, adds:—"Quæ quidem omnia, per spatium minus quàm trium horarum, animæ et corporis solvunt commercium." (*Theses*, p. 13.)

[202] *Meigs' Philadelphia Practice of Midwifery*, second edition, p. 358.

expressed, must be regarded as referring to partial inversion. Without concurring fully with Dewees,[203] I feel strongly impressed with the opinion that total inversion can only be replaced by attempts being instituted almost immediately, and before the uterus, and particularly before its cervix, has become contracted. I know of only a single case opposed to this statement,[204] and that is not sufficient for affirming a different rule, and encouraging the surgeon to expect to reduce a total inversion after weeks have elapsed. The inversion being reduced, there is a good prospect of perfect recovery, except violence have been used in effecting the object, or the patient have previously sunk below the possibility of rallying, by losses and nervous shock, which are often so severe that several hours elapse before there is any satisfactory improvement, and weeks often pass away ere the powers of the system are fully restored. If reduction be not accomplished, the immediate danger is much greater, and the ultimate result, in a majority of instances, fatal.[205]

Mal-treatment where the disease has been mistaken, or great violence applied in attempts to effect reduction, has so often proved injurious, that it has been asserted the patient has a better chance when the disease is entirely overlooked, provided the inverted organ remain in the vagina.

Where the malady remains unreduced, and passes into the chronic stage, exhausting hæmorrhages are still the great source of danger, inducing hectic symptoms sooner or later in a great majority of instances, at periods varying from eight or ten months to two or three years; but patients of good constitution, and with

[203] "I would not dare to say that it would be impossible to restore the uterus after its complete inversion, though I believe it at this moment." (*Midwifery*, eighth edition, p. 477, in foot-note.)

[204] Dr. Smart reports a case of total inversion, reduced by a particular process, at one month after delivery, and which will be subsequently quoted under treatment. He feels certain that "he did not mistake a partial for a complete inversion." (*American Journal of the Medical Sciences*, xvi., 83.) Delpech asserted that total inversion once established, reduction became impossible. (*Des Maladies réputées Chirurgicales*, ii., 591.)

[205] Total inversion with prolapse is necessarily fatal if left unreduced and not replaced in the vagina. It is, perhaps, to this case Le Roux alludes when he says,—"lorsqu'il n'a pas été possible de faire la réduction de la matrice renversé totalement, il faut régarder la femme comme perdue sans resource." (*Sur les Pertes de Sang, &c.*, p. 169.)

the advantages of a favourable age and the absence of sexual exeitement, brave occasionally all the symptoms until the critical period, the eessation of the menses, is surpassed, and go on for twenty or more years, giving ample opportunity for death arising from other maladies, and enabling one to say that the patient did not sueeumb from the malady now under consideration. Under no other eondition can it be stated that chronic inversion persists with impunity; and with the lower classes it will generally lead to prolapse in advanced age, and by eonstant irritation, diseharges, suffering, and uneleanliness, wear out the vital powers of the female thus unfortunately afflicted.

The earlier writers broached unfavourable opinions as to the great danger of gangrene of the inverted organ, whieh prevail even to the present day;[206] but these opinions seem not deserving of unconditional support. When the gangrene results from the depressed eondition of the patient's system, or as a termination of inflammation in the uterine organ itself, the danger may be as great as has been represented; but where loeal causes, such as eonstrietion by the eervix uteri, determine the gangrene, this has sometimes led to reeovery, with the loss of the organ, aeting on the same prineiple as when the uterus is removed by operation with the ligature. Where the gangrene is superfieial, affecting only the mueous eovering of the inversion, reeovery may be caleulated upon, under proper treatment and a favourable state of the general health.

The spontaneous replaeement of uterine inversion, obscured as we find it by some very puzzling narratives, claims an extended notiee. By it is, or should be, meant, the reposition of the inversion by the action of the parts themselves,—the uterus, its appendages, and sueh other of the abdominal contents as by their living actions can be supposed to exercise any favourable influence, but unaided by any foree aeting from without. That *depressio* and *introversio* may be spontaneously replaeed is beyond all doubt. It is not less eertain that total inversion is never righted spontaneously. The essenee of the question, therefore, as to this spontaneous change, centres in partial inversion in the degree of

[206] "Gangrena insecuta periculosissima est; medela fere omnem respuit." (Weber, *Diss.*, p. 45.) Sabatier regarded gangrene as fatal. (*Mém. de l'Acad. de Chir.*, iii. 365, octavo edition.)

perversio; and the cases recorded, so far as my researches extend, are consistent, and may be regarded as probable, by being all instances of partial inversion. There is not a shadow of evidence of a *total* inversion of the uterus, taking that term in the strict meaning defined in an early page of this Treatise, replacing itself spontaneously. Neither speculative arguments, nor even experiments, can take precedence of sound evidence based upon actual experience. Those who are experienced can have no doubt that the round ligaments (which Dailliez and others regarded as muscular, and which are endowed with power equivalent to that structure,) are capable of aiding in spontaneous reduction; besides which, there is an elasticity in the uterine tissue itself, as evidenced under successful efforts for the reduction of partial inversion, which seems calculated to assist the round ligaments. Explain the result as we will, there is ample evidence of spontaneous replacement of partial uterine inversion having happened at various periods from a few weeks to a month or more after partial inversion became established.[207] The requisite condition for this rare and fortunate result may be described as limited to partial inversion,

[207] It is scarcely necessary to adduce evidence that *depressio* may be spontaneously replaced; it will usually happen if the causes that gave rise to it be removed. Even in *introversio* the same favourable course may ensue. Gardien strongly supports the doctrine that, so long as all the inverted portion is above the *cervix uteri*, spontaneous reduction may take place. (*Traité des Accouchemens*, iii., 336.) Practical experience accords with this view. Many authors observe that, having reduced recent *perversio* until the fundus was within the *os tincæ*, they found it escape from the hand, and become spontaneously righted, as if by its own elasticity. Newnham considers that "this rare and happy event can only happen in the case of a simple depression," and he justly adds, "even then it can never be relied upon." (*Essay*, p. 11.) Much less is it to be relied upon in *introversio*. "Eine spontane Reposition gehört zu den seltesten Erscheinungun." (Moser, *Lehrbuch der Geschlechtskrankheiten*, s. 202.) Thouret argues in favour of spontaneous replacement in the commencing degree of *perversio*, where the inverted fundus only just projects beyond the *os uteri*, and offers an explanation of the method by which the change is effected. "La Matrice sortant de son état d'inertie, les forces contractiles de la portion qui n'est pas renversée repoussent la partie déprimée; et d'un autre côté, les fibres de cette partie affaissée, plieés à angles aigus, ne peuvent se contracter sans tendre à se redresser, et relever ainsi ce qui est enfoncé. (*Essai sur l'Introversion Utérine*, p. 16.) "La matrice deprimée ou à demi renversée, peut se restituer spontanément dans son état naturel, si les causes qui l'ont deprimée ou renversée à ce point cessent d'agir." (Dailliez, *Thèse*, p. 27.) Lassus goes too far when he says,—"la matrice totalement renversée depuis long temps, peut se reduire d'elle même dans sa place naturelle" (*Pathologie Chir.*, ii., 122.) Saxtorph's third case

(*perversio,*) where there is no congestive constriction by the cervix, and neither inflammation nor its effects interesting or affecting the inverted organ.

The case of Madame De la Barre, so minutely related by Boyer,[208] where an accidental fall upon the floor, at six months, caused replacement, and another, Madame Bourchalatte's, by Baudelocque,[209] equally, and in like manner, successfully replaced

is most interesting: he was called to a recent inversion, where the projecting fundus was so firmly grasped by the cervix uteri that he could not effect reduction. Antiphlogistic means were adopted without any hope of reposition, but the inversion spontaneously retired, and the woman had a child afterwards. (*Gesammelte Schriften von Scheel*, s. 308; *Acta. Soc. Med. Havn.*, iii, 404; also *Fries*, s. 34.) Le Roux, of Dijon, found the inverted uterus prolapsed at the labia, about a month after delivery; the displacement had advanced slowly. The patient was left to her fate, under the idea that reduction was impracticable. The tumour afterwards retired within the vagina and disappeared; the menses returned, and the inference was that there was spontaneous reposition of the inversion. (Dailliez, *Thèse, Obs.* 5, p. 36.) Dr. Thatcher assures me of his being called to a patient a fortnight after delivery, and finding the inverted fundus at the labia, no attempts were made to reduce it; but the tumour gradually disappeared, and there was no trace of it at the expiration of a month. The woman bore children afterwards, and he regards it as an instance of spontaneous recovery. These rare cases, however truly narrated, must not be permitted to mislead us as to the improbability of their recurrence. Boyer cautions us to distinguish between "le vrai et le vraisemblable," (*Mal. Chir.*, x., 519,) and Lisfranc, descanting on this same topic, reminds us that "multa sunt vera quæ non verisimilia." (*Clin. Chir.*, iii., 392.)

[208] De la Barre, a surgeon, trusted his wife's accouchement to a midwife, and when inversion occurred, he delayed all attempts at reduction until it proved too late for success; but at the expiration of six months, in getting out of bed, the patient fell on the floor:—"à l'instant même elle ressentit dans le ventre un mouvement extraordinaire, accompagné d'une douleur très-vive, d'une perte plus abondante et de defaillances." The husband, on examining, found no longer any tumour in the vagina, but the cervix so relaxed that he could introduce the finger deep into the cavity of the uterus. (Boyer, *Mal. Chir.* x., 515; also Dailliez, *Thèse, Obs.*, 33.)

[209] This lady, having suffered inversion after her first delivery, went on for eight years before she applied to Baudelocque, who found the inverted fundus protruding through so relaxed a *cervix*, that he could carry his finger all round within it, and ascertain the depth at which the membrane covering the neck of the tumour was reflected upon the uninverted part of the uterus. Attempts at reduction were meditated by Baudelocque, but before the time arrived she fell upon the floor, just as her attendants were lifting her up to walk her about the room, and suffered so much pain in the body that she fainted. Baudelocque was immediately summoned, and found the os tincæ sufficiently dilated to allow him to examine the whole uterine cavity; but the tumour was gone. She was a widow at this time, and in a cachectic condition from frequent losses; but she regained health, married, and became pregnant. (Dailliez, *Thèse, Obs.*, 34, p. 107; also Boyer, *Mal. Chir.* x., 516.)

after eight years, have hitherto been erroneously ranked with examples of spontaneous reversion, but are evidently instances of external force casually applied, and by a blow, or *par secousse*, happily effecting the cure.

The most recent contributions to this part of the history of uterine inversion have been supplied by Dr. C. D. Meigs, of Philadelphia,[210] who believes that the inversion in one case which came under his care was spontaneously righted, after having persisted for two years; and, in a second, for several weeks. It is easier to cast a doubt over the reality[211] of these spontaneous recoveries than to remove the obscurity which pervades the subject generally. Considering the great experience of Dr. C. D. Meigs, the practical tact he must be possessed of, and the minute detail he has given of his investigations for diagnosis, the least we can concede is, that the matter must remain *sub judice*, and await

[210] *First Case.*—The disease dated from her delivery, two years before, and had existed for that length of time, when Dr. Meigs was consulted. He took the greatest pains to discriminate, and remained under the absolute conviction of its being inversion of the womb; several others concurred in the same opinion. Fruitless attempts were made to reduce the part. Four years afterwards she became pregnant. *Second Case.*—Nearly five weeks elapsed after delivery before the patient was examined and the vaginal tumour investigated by the speculum, and also by the hand introduced into the vagina, till two fingers passed within the cervix uteri and reached the limit of the cul-de-sac, enabling the investigator to convince himself that the tumour within the vagina was "the inverted womb and nothing else." After a temporary absence, this patient returned, became pregnant, and gave birth to a child. Hence Dr. Meigs concludes, that the inverted womb "may reposit itself in some rare instances." (*Colombat de l'Isère, Dis. of Women*, translated by C. D. Meigs, pp. 182–4.) The deficient account of the method of diagnosis in the first case is, in some degree, supplied in the second; but there is still an absence of that minute detail of proceedings, which, in the present day, is alone calculated to convince the sceptical reader. It may be asked, if we suppose in either case there was polypus, and not uterine inversion, "what became of the polypus?" Perhaps it may be answered, that it is more easy for a polypus to be separated and thrown off than for chronic inversion of the uterus to reposit itself spontaneously. Whilst the question remains undecided, and further evidence is needed, we have only to take care that the right rule of practice prevails. Velpeau, one of our best authorities on chronic inversion, remarks:—"Des faits de ce genre ne doivent être considérées que comme d'heureuse exceptions; il n'est pas aucun praticien sensé qui oserait compter sur de pareils résultats." (*Leçons Orales de Clin. Chir.*, ii., 427.)

[211] "It is easier to conceive that an experienced man should commit an error of diagnosis, than to understand how any efforts of nature could cure a chronic inversion of the womb." (Dr. West's "Report of the Progress of Midwifery," in *Forbes' Brit. and For. Med. Review*, xx., 542.)

further elucidation. The belief of Dr. C. D. Meigs in the correctness of his own views regarding these cases is strongly evinced in his publication; and he further supports the same in arguing, in a letter addressed to myself, that on close examination "we should find reasons for thinking the spontaneous reposition possible, viewing the relaxation of its texture that is known to be coincident with each menstrual act, and referring to the tendency of the round ligaments to withdraw the fundus from its deep invagination."

If we subtract all errors, and admit only the well authenticated cases, it may still be remarked that spontaneous replacement is too rare an occurrence to have any influence upon the correct rule of practice, viz., effectuating by art the reduction of partial inversion of the womb in all its different degrees.

Whether the inverted organ have been replaced spontaneously or by art, the recovery may be so perfect that future pregnancy will take place, equally as if such a malady had not occurred; but if much injury have been sustained, and severe inflammation in the uterus or its appendages supervened, pregnancy will be precluded.

On the other hand, sterility is to be regarded as the invariable and necessary consequence of persisting inversion of the womb.[212] This may be asserted, in spite of the enigmatical case recorded by Chevreul,[213] which has been silently sanctioned by many writers of the greatest distinction, and given rise to much ingenious speculation for explaining the supposed occurrences. Although

[212] "Elle est condamnée à vivre en célibataire et dans une sterilité absolu." (Dailliez, *Thèse*, p. 3.)

[213] A woman was believed to have an inversion of the uterus at delivery, which the midwife mistook, and replaced in the vagina unreduced. She became again pregnant after ten months, and expelled a fœtus after three months of gestation; after this event, the uterus was found still inverted. Chevreul thought the fœtus had been developed in one of the Fallopian tubes. (Dailliez, *Thèse*, p. 81.) Boivin and Dugès suggested that there was a double uterus, one only of which became inverted. (*Mal. de la Matrice.*) There is no satisfactory evidence that the uterus was inverted at the first labour; all rests upon the midwife's statement. Suppose that it was only simple prolapse, and all difficulty will be removed, as has been remarked by Moreau, who considers that in the second pregnancy an abortion happened at three months, when the fœtus, escaping from the uterus into the vagina, allowed the placenta and the inverted uterus to pass by it, and to escape externally, and this organ being put back, still inverted, the fœtus only escaped from the vagina after a lapse of five days. (*Des Accouchemens*, i., 256.)

doomed to sterility for the rest of life, the sufferer from inversion of the womb does not always live a life of celibacy, a case being related where a patient, still afflicted with chronic inversion, married.[214] The rarity of such an occurrence alone prevents a medico-legal question being raised thereon in a court of justice.

Since polypus, however slowly, does sooner or later prove fatal unless removed, it may readily be conceived that, where complicated with the formidable addition of an inversion of the uterine organ, its prognosis is still more unfavourable. Inversion from polypus is not reducible whilst the original complaint remains; the removal of the polypus is the only way to effect a cure of this two-fold malady. In all the slighter degrees of partial inversion, as soon as the polypus is removed, the displacement will generally be spontanously rectified; even in *perversio* the same may happen, but not so in total inversion resulting from polypus.

In concluding this second part of my Essay, I indulge a hope that what has been written may awaken attention sufficient to secure the more early and certain detection of inversion of the womb, as well as prevent its too frequent occurrence. I purpose to close the subject by a review of the treatment, (including the removal of the inverted uterus,) upon the same plan as to literary references, unless the conviction be thrust upon me that it will neither be advantageous to the public nor acceptable to the profession.

[214] Dr. C. D. Meigs communicated to me this fact about three years since.

EXPLANATION OF THE PLATES.

PLATE IX.

This plate represents the specimen of chronic inversion of the womb found in the dissecting room by Professor Mackenzie, of Glasgow, many years since, and referred to in Section III. of the First Part of this Essay, where the outline figures 9 and 11 define the transverse and antero-posterior dimensions of the inverted portion of the organ. An anterior view is presented in this plate, and the front walls of the vagina being removed, (*a*) points to the internal surface of the remaining portion of the vagina, into which projects (*b*) the inverted body and fundus of the uterus. The cut surfaces of the vaginal walls are designated by (*c c*), and (*d*) rest upon the peritoneal surface. The dotted line (*e*) directs you to the entrance into the peritoneal cul-de-sac of the inversion, into which enter the round ligaments (*f f*) and the Fallopian tubes (*g g*). The peritoneal surfaces of the cul-de-sac are not adherent, although the inversion had probably existed for many years.

PLATE X.

This plate refers to the same preparation as the preceding one, and shows the cut surfaces of the anterior half, after a transverse and longitudinal section of the uterus and vagina. It explains the case to have been *perversio extrema*, the cervix being the only part of the uterus uninverted. The vagina (*a*) can be traced, containing the inverted organ. The divided surface of the fundus is (*b*), and (*c c*) are placed at the angles of inflexion. The surfaces (*c c*) to (*d d*) mark the extent of the uninverted *cervix* of the uterus, *which* terminates in the thinner walls of the vagina (*e e*). The peritoneal cul-de-sac is pointed to by (*f*), and the Fallopian tubes (*g g g g*) are seen passing along the whole course of that cavity, to reach the inverted fundus. The round ligaments (*k k*) enter the same cul-de-sac; (*h h*) the ovaria; (*i i*) the broad ligaments.

PLATE XI.

This plate refers to the case met with by Dr. J. C. Cooke, and which has been described in Section IX of this Essay. (See notes 109, 110, and the corresponding text.) The entire uterus, inverted, was detached and brought away by the midwife, about thirty-six hours after delivery, and is now preserved in the Pathological Museum of Queen's College, Birmingham. It exhibits precisely the appearances represented in the plate, which is lithographed after an admirable drawing made by Mr. Samuel Moreton, the curator of the museum.

By the instructed reader the parts will be so readily distinguishable, that all letters of reference arc dispensed with. The inversion was total, and the separation took place at, or just above, the cervix uteri, a small portion of the inverted vagina being still attached to the specimen, and forming the summit or apex of the drawing. To expose the peritoneal pouch formed by the inversion, a longitudinal section has been made from the cervix to near the fundus, showing the thicknesss of the uterine walls,

which in some places is more than an inch; the sinuses are also exhibited by this section. To the extreme left one Fallopian tube is brought out of the peritoneal pouch in which it lodged, and is suspended by a thread; it ends in the depending fimbriæ. An inch above this is one of the round ligaments, similarly displayed, but the broad ligament connecting the two has been torn away. On the other side are seen the second Fallopian tube and round ligament, also brought out of the peritoneal pouch, and spread round the uterus, the broad ligament intervening, and uniting them. The flocculent appearance of the mucous lining of the uterus, now converted into its exterior covering, is well represented, and a bristle marks the opening of one of the Fallopian tubes. After a careful inspection of the original preparation, I can affirm this plate to be a correct and most striking representation of it.

PLATE XII.

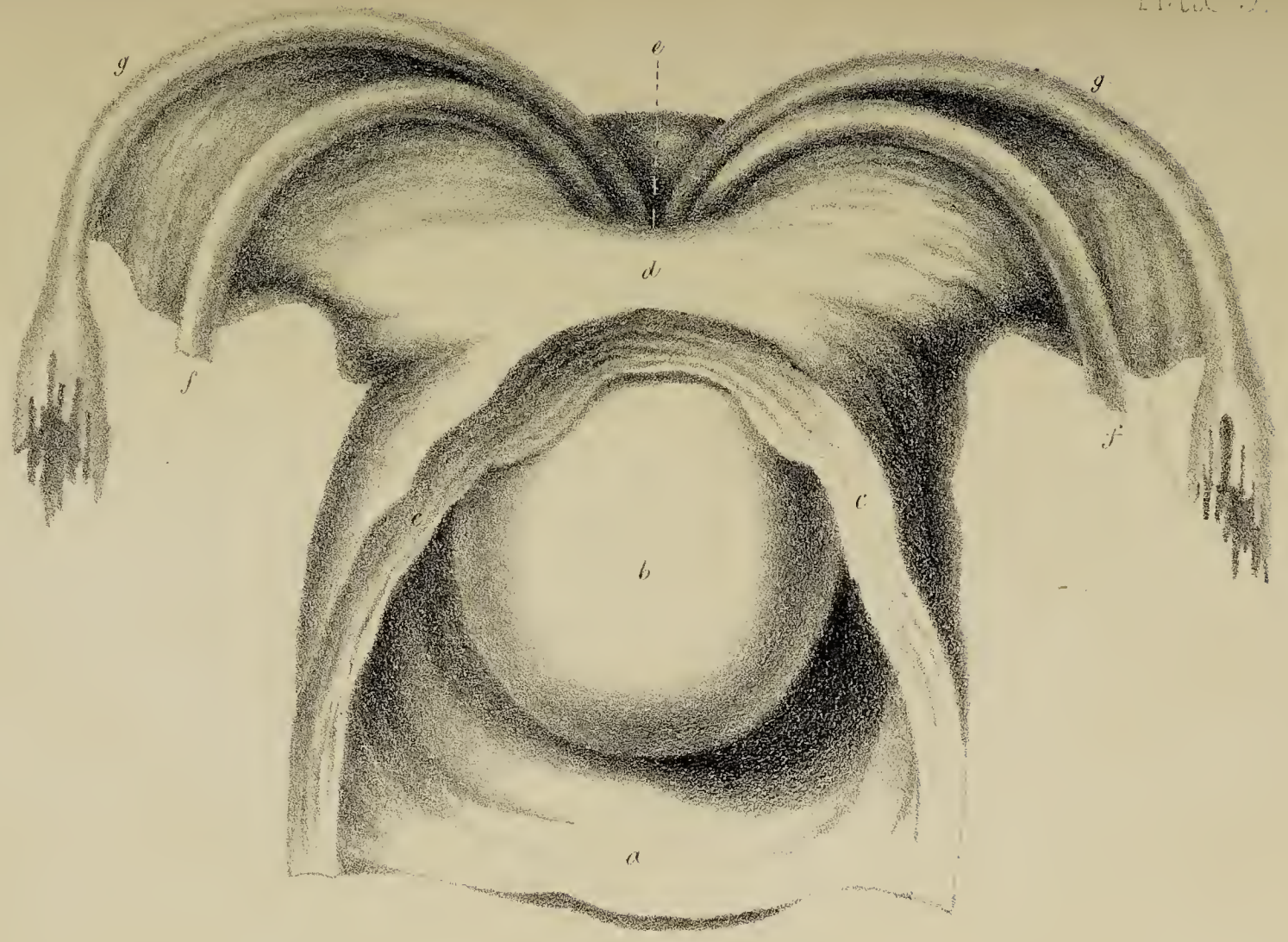
Represents a portion of the uterus, which, having nearly lost its vitality during a very lingering labour, collapsed after delivery, and, as I conjecture, became inverted, and thus the whole organ was cast off with safety to the patient. (See notes 111 and 112 of Part II. of this Essay, and the corresponding text.) The surface presented to the view is the internal lining of the uterus, on which are seen many large sinuses still patent. At (*a a a*), the thickness of the uterine walls is shown as these appeared on a section being made; these cut surfaces are marked by many divided sinuses, and the walls are exhibited to be less thick than usual. A fibrous tumour, about as big as a walnut, projects from the inner surface of the uterus; (*c c*) mark the membrane or capsule which covers it, and (*d d*) the divided surfaces of the tumour. Again at (*e*) there is a prominence or convexity presented on the uterine surface, caused by another fibrous tumour, situated in the uterine walls. Mr. E. Crisp, of Walworth, having favoured me with the preparation, that I might leisurely inspect it, I had the drawing, which corresponds to this plate, taken whilst the parts were still in my possession.

PLATE XIII.

The preparation, for many years preserved by Professor Mackenzie, as an example of chronic uterine inversion found in the dissecting room, and erroneously quoted as such by me in Part I. of this Essay, (see Section III., outline figures 8 and 10,) is here represented. The view offered is posterior, and the vagina being opened, and partly cut away, the vaginal cavity (*a a*) is exposed, in which hangs the tumour supposed to be the inverted uterus. The thickness of the divided walls of the vagina is indicated by (*b b*); the Fallopian tubes (*c c*) terminate at the fimbriæ (*d d*); but one of those tubes on the right side bifurcates, and thus has two separate ends; (*e e*) the round ligaments; (*f f*) the broad ligaments; (*g g*) the ovaria, that on the left side being enlarged into several cysts. The proper uterus is laid open, and its divided walls (*h h*) are observed to be very thin and attenuated, whilst its cavity (*i i*) is large; but it is demonstrated to be the uterine cavity, by the Fallopian tubes, still pervious, being ascertained to open into it in the usual way. At the upper part or fundus of the attenuated uterus is situated a small fibrous tumour, of the size of a marble, projecting into the uterine cavity; it is divided, to show its texture, and the dotted lines proceeding from (*j*) point to the divided surfaces of this tumour. Another small fibrous tumour (*k*) is situated on the outer surface of the uterine walls. The tumour (*l*), projecting into the vagina, is described in the next plate.

PLATE XIV.

This is an anterior view of the same specimen as is represented in the preceding plate, and the letters from (*a a*) to (*g g*) inclusive refer to the same parts in both plates. The anterior aspect of the fundus and body of the uterus is marked (*h*). The cervix uteri and vagina are opened anteriorly by a longitudinal and mesial section, which is continued through the tumour; the covering membrane (*i i*) of the portion of the tumour projecting into the vagina is seen to be continuous with that lining the vagina; the divided surfaces (*j j*) of the tumour demonstrate its fibrous character. At (*k*) the cervix uteri has been cut through, making it apparent that this tumour had its origin in the cervix, and during its development had been forced downwards into the substance of the anterior lip of the os tincæ, the fibres of which it has separated, being covered with the mucous membrane only, in all its larger portion, or the portion projecting into the vagina. As there is no communication between the uterine and vaginal cavities, it must be inferred that in its growth and progress downwards this tumour, by pressure, caused adhesion between the opposed mucous surfaces, thus obliterating the *os tincæ*. After this obliteration the cavity of the uterus became distended with the mucus secreted by its lining membrane, and in proportion as this mucus was formed the uterine walls were thinned; or, perhaps, we may admit that, the *os tincæ* being closed, the uterus became atrophied as a useless organ. (See Part II., Section XI., notes 166, 167, and the corresponding text.)



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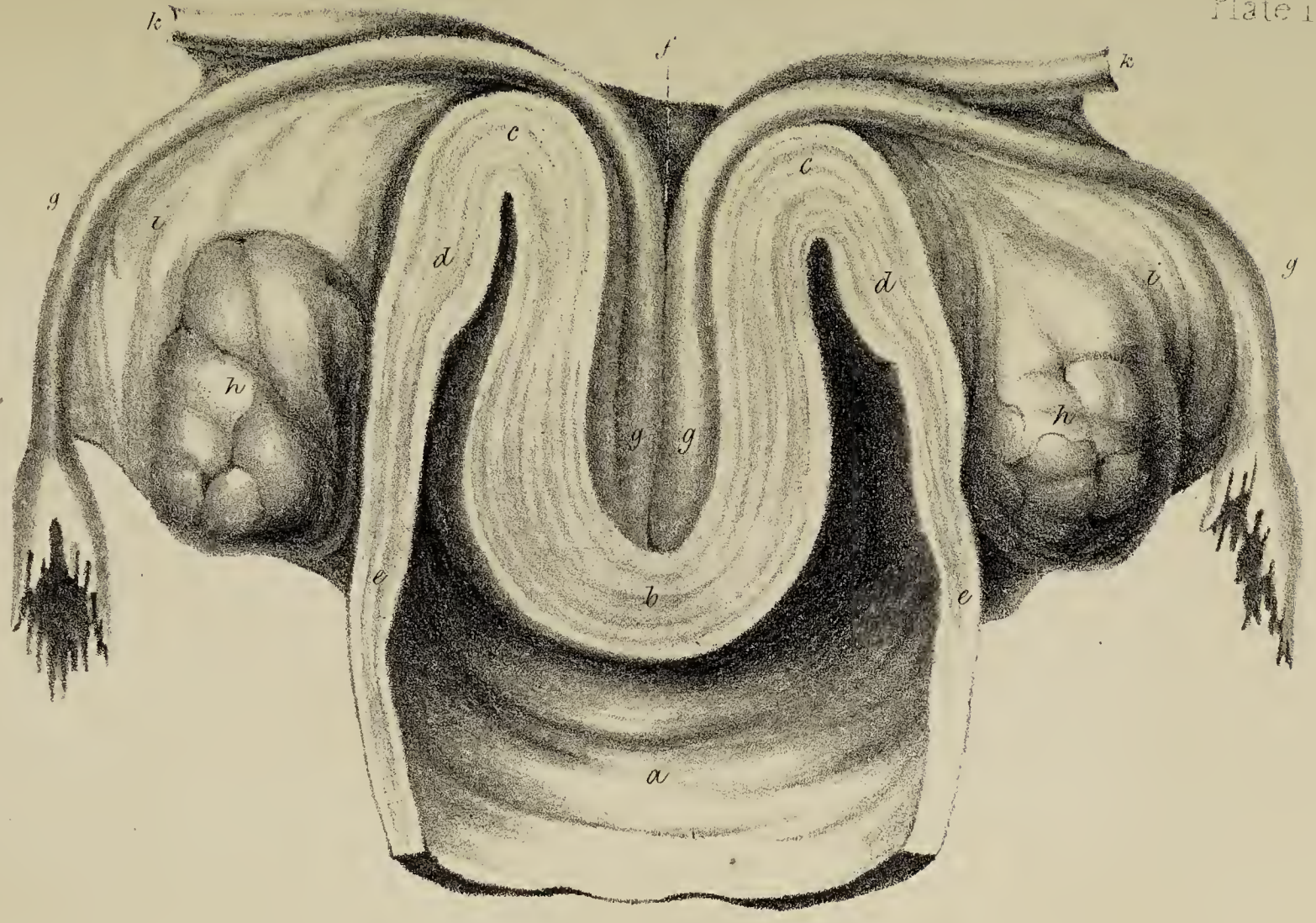

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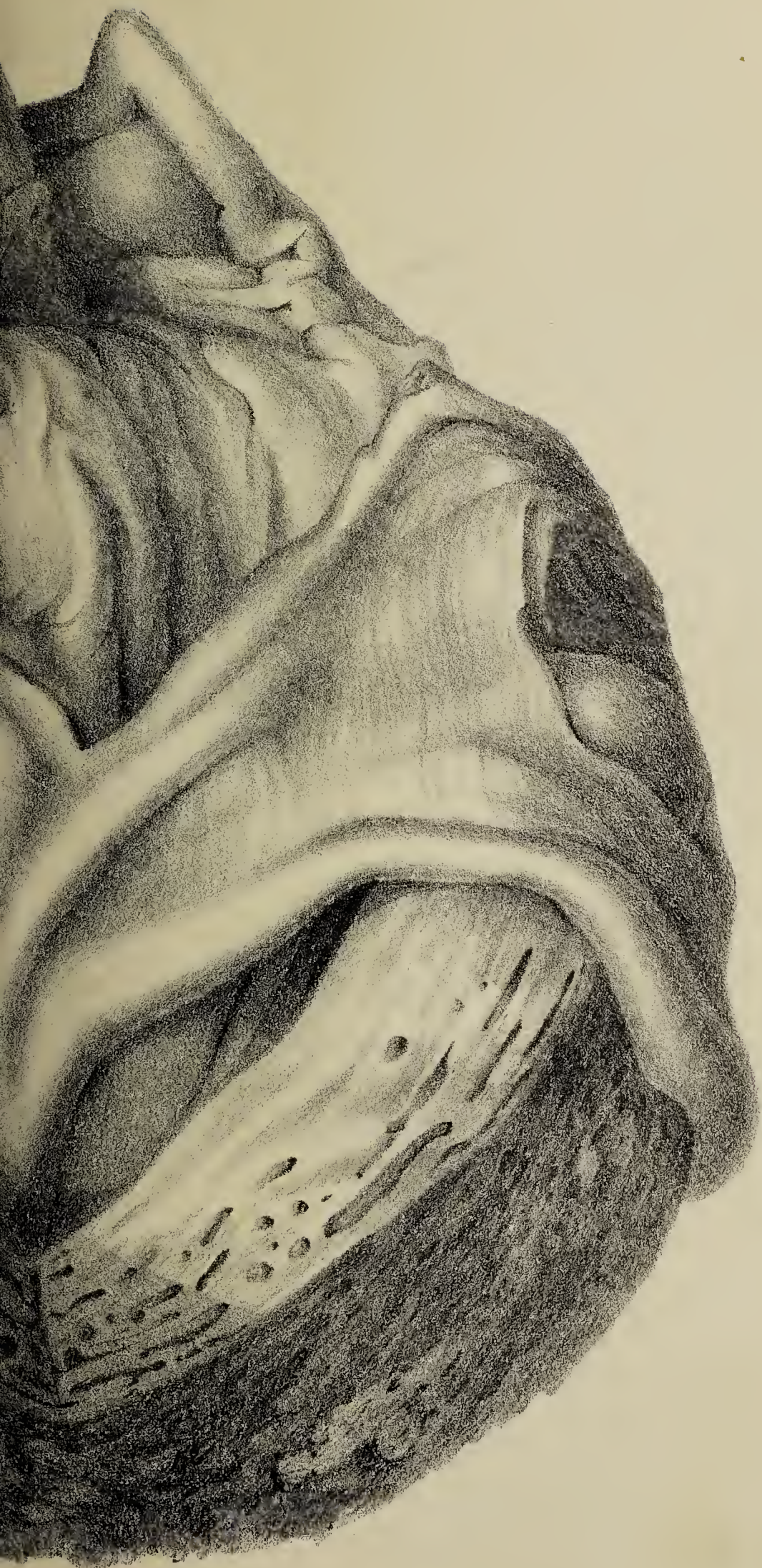

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Plate 13.

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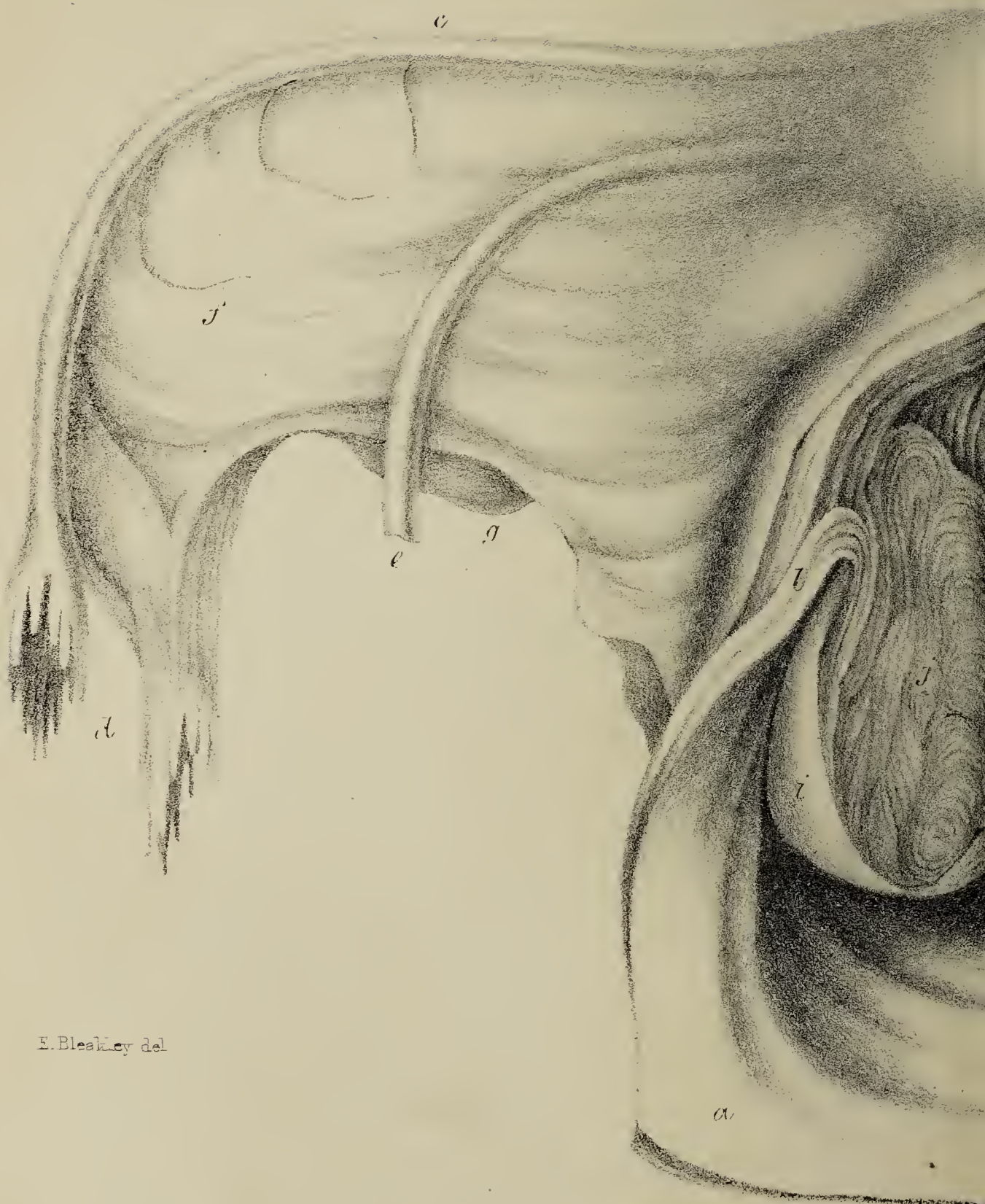

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Plate 14.

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ON

PATHOLOGICAL MEMORIALS,

BY JAMES PAXTON, M.D., RUGBY;

READ AT THE

FOURTEENTH ANNIVERSARY MEETING

OF THE

PROVINCIAL MEDICAL AND SURGICAL ASSOCIATION,

HELD AT NORWICH,

ON WEDNESDAY AND THURSDAY, AUGUST 19TH & 20TH, 1846.

GENTLEMEN,—In requesting your attention to the following observations on the various means for preserving memorials of disease I shall offer no apology, for although it might be deemed but a collateral branch of medical science, yet its importance will, I hope, be fully appreciated.

This is a subject which I lately had the pleasure of hearing introduced to the Birmingham Pathological Society, by Dr. Knox. He has since published the substance of his lecture in the *Medical Times,* in which many ingenious arguments are brought forward to prove that nothing else than *painted casts* are capable of conveying to the mind a correct idea of morbid objects; and certainly his talents and experience fully qualify him to offer an opinion on this question. Now, without stopping to ask whether casts have not been overrated, I intend briefly to review the usual methods of obtaining *morbid records,* and submit to your judgment their relative value.

After describing the advantages and disadvantages, the merits and defects, attending the different processes of conservation, I intend to avail myself of the present opportunity of stating the

reasons for giving a preference to the *graphic art,* briefly trace its progress in its general application to professional pursuits, and speak particularly of the facilities with which it may be employed in the registration of morbid phenomena.

The earliest and most simple memorials were *dry bones,* I mean diseased bones; but it is evident that the maceration they have undergone has deprived them of nearly all the animal matter which entered into their composition. The second mode was that of injecting the vessels, drying and varnishing them with the muscles; but these preparations soon become blackened and contracted, and we can scarcely recognise them as the thing they represent. The third plan, that of immersing the specimen of disease in spirit, or some other transparent antiseptic fluid, is found to have fewest objections. When, however, we look at the 1,000 jars which furnish the shelves of the best pathological collections, we behold almost the whole series perfectly blanched. If we except those affections of the lungs in which there are carbonaceous deposits, we find that neither the livid congestion of the venous system, as in hepatization, nor the florid hues of the arterial circulation in the different stages of inflammation, remain unchanged. There is little to indicate the peculiar vascular conditions which have led to, or attended, the results we are contemplating. In most of the wet preparations, endosmose and exosmose, have brought about an interchange of fluids, which has deprived the specimen of its most distinguishing features.

But although we might designate preparations merely *relics,* exhibiting nothing more than the consequences of chronic disease, yet a moment's reflection must convince us that they are essentially requisite to our obtaining a comprehensive acquaintance with morbid metamorphoses and those vices of texture which presents such various phases. Were we to obtain an insight into disease solely from recent inspections, our acquaintance with the effects of organic derangements would be exceedingly limited. Collections and museums, therefore, are indispensably necessary, both to the teacher in a school of medicine and to others as a useful reference. It is true preparations are usually blanched or discoloured, but a verbal or written account should be at hand to supply all that is deficient.

Casts of disease are very well calculated to perpetuate their form and position, but they by no means exhibit any other

characteristic of the specimens which they represent. The best I have seen have been but indifferently painted; nor do I know how they can be copied with the true colouring, inasmuch as the process used for the formation of moulds, injures the colours of the specimen. If painted, it must be only from recollection, or from a faded hue. Dr. Thibert has produced some good examples of castings, but, like all other casts, they fail in expressing the *texture* of the disease. We may, consequently, infer that, to produce a pathological cast, with the exact appearances of the recent inspectio, is a vain attempt. Where, however, a cast or model can be executed from the patient during life, the artist having the opportunity of finishing his work from unaltered patterns, then, it is quite possible that it may be brought to great perfection in its approximation to nature.

Of this there are abundant examples in those which represent external affections. The museum of Guy's Hospital contains a fine collection of this class of models, by Mr. Townsend. His series of models showing the diseases of the skin exceed 300. These very justly excite the admiration of the profession.

The last order of pathological memorials which we shall refer to are those which are *pictorial.* You have, no doubt, remarked the increasing attachment there is to such illustrations, and how pleasingly they contribute to the popularity and extension of science and literature. The fine arts, moreover, are now cherished, pressed into the service, and are become the hand-maid of philosophy, chemistry, botany, and medicine, as we may have witnessed in the magical effects of the photogenic process and the Talbotype. M. Donné has profited by this wonderful invention, and by this means has given the appearances of the animal fluids. Indeed, the discoveries of the microscope, when revealing to us the elementary forms of disease, frequently require of the demonstrator some appropriate drawing. It is very possible that the Talbotype may be further available in the registration of morbid phenomena; but to exhibit the redness of inflammation, and the varieties of inflammatory products, as purulent, or other infiltrations, require a more complete mode of representation than the light and shade of the Talbotype. I shall, nevertheless, attempt to prove that all the diversities of abnormal tissues and depositions may be represented by coloured drawings.

Here let me observe that as far as drawing and painting are applicable to morbid anatomy, they are by no means difficult. To draw a specimen needs neither inventive faculty nor a knowledge of proportions or perspective. It is only necessary to have the organs of perception and imitation so far exercised as to be able to copy simple forms and appearances. A practical pathologist might soon acquire as much artistic skill as is usually possessed by pathological draughtsmen. It will encourage him in the attempt when he reads the following remark made by Dr. Klein Grant on Dr. Hope's drawings,—"They have a double value from being drawn by one who, as a thorough morbid anatomist, understood what he was representing, and could give it a degree of accuracy of expression unattainable by the ordinary artist." To painting Dr. Hope was devoted, and successful. When house-physician to the Edinburgh Royal Infirmary he began to carry into execution his idea of a work on morbid anatomy, to be embellished with plates. He employed an artist for some months, but at length discovered that it took more time to superintend and correct him than to execute the drawing himself; therefore, he adopted the latter plan. His general rule was to finish each drawing at a single sitting, or, at the utmost, two. In order to avoid changes of colour in the specimen from too long exposure to the air, the drawing ought to be completed within a few hours after removing the specimen from the body.

It may not be uninteresting to review the progress of artistic pathology. Pictures of a distant period may be seen in the museum of the Royal College of Surgeons, in London; they are, as we may suppose, rather rude specimens of art. The Anatomico-Chirurgicarum of Ambrose Paré, dated 1585, and the Decades of Bidloo, of 1708, contain curious figures, excellent for that time, although but distantly approaching to reality.

At the commencement of the seventeenth century, Cheselden's plates of diseases of the bones astonished every one by their great fidelity to nature, for they were drawn by means of a camera obscura, and, like the *sun-pictures*, they were the *pencil of nature*.

The advantages of depicting the phenomena of disease now became apparent; it rendered a verbal description of cases at once clear and intelligible. Several continental works soon followed, containing illustrations of great merit; among which I will only

mention, in 1761, those of Morgagni,—*De sedibus et causis Morborum,* and Edward Sandifort's *Observationes Anatomico-Pathologicæ.*

Up to this period painting was little cultivated or patronised in this country. The year 1768, however, constituted a new era in the history and advancement of art, by the founding of the Royal Academy. About this time casts of the ancient statues were imported from Italy, and public and private collections of pictures of the old masters were also formed, and thus much greater facilities were afforded for the study of the productions of the Italian, Dutch, and Venetian schools. The public taste, in consequence, became more refined, and British art, which had scarcely a name in its own country, was now celebrated all over Europe. The paintings of Sir Joshua Reynolds, West, and Wilson, not only adorned the palaces of royalty and the galleries of the nobility, but they were held in equal estimation with Rubens, Vandyke, and Claud Lorraine.

Medicine and surgery, in connection with our own artists, received no very immediate benefit by this advance; for in 1770, Dr. William Hunter, wishing to engage the first-rate talent, was obliged to employ a foreigner, of the name of Ramsdyke, to make the drawings from which the plates of his splendid work on the *Gravid Uterus* were engraved.

In adverting to those who have contributed to the improvement of graphic pathology, I have only to name Sir Astley Cooper, in connection with his magnificent plates of *hernia,* to call forth your highest commendation; and they are far beyond any praise I am able to bestow. We may venture to assert, that the utility and celebrity of this great undertaking is principally owing to its exquisite designs.

It would be an omission were we not to notice John Bell. His lively descriptions of local disease, injury, or surgical operation, were rendered more impressive by spirited sketches. Some of his drawings were singularly brilliant; they corresponded with his narrative. The one consisted of a tale of surgical enterprise, skill, and success; the other was a picture, which rendered lucid our conceptions of the facts of his cases. Thus, together by his pen and his pencil, he has handed down to the student many admirable lessons in surgery.

Sir Charles Bell pursued the same course as his brother, by graphically illustrating all his writings. That he was one of the greatest artists belonging to our profession, his specimens of morbid parts in his collection, published in 1813, amply testify. We sometimes regret that his performances were loose and exaggerated. His paintings of gun-shot wounds, in the Royal College of Surgeons, in Edinburgh, are interesting, and claim the attention of the visitor.

Dr. Baillie's work on *The Morbid Anatomy of the most Important Parts of the Human Body,* appeared in 1818. The figures are by the best engravers, from drawings by Cliff. For truthfulness in their representation and beautiful finish they never were surpassed.

Hitherto plates had been printed with black ink only. The invention of printing in colours was found particularly applicable to pathological subjects, and greatly contributed to the production of a more striking and natural appearance in engravings.

Dr. Bateman availed himself of this improvement, and in his delineations of cutaneous diseases, dated 1814, we have the beautiful imitation of nature never before attained. The superior powers of colours over mere light and shade in the portraiture of morbid affections, were now established. Rayer's *Traité Theorique et Pratique des Maladies de la Peau,* &c., was completed in 1826. Subsequently, Alibert's *Description des Maladies de la Peau,* &c., also, has given an example of what may be effected by colouring plates. In the latter work, perhaps, they are too glaring; yet, diseases of the surface of the body are so well expressed by these authors, that those who are experienced in diagnosis, will have no difficulty in recognizing each disease at a single glance.

The *Anatomie Pathologique du Corps Humain* of Cruveilhier, published in 1828 and 1831, is in a bold and an attractive style; but some of his figures are not coloured, and are deficient in minute detail. They barely give a general view of morbid appearances, without conveying precise ideas of the anatomical textures.

Allow me again to refer to the lamented Dr. Hope. His beautiful *Compendium of Morbid Anatomy* appeared in 1834. He possessed a refined taste, and an acute perception of excellence. Great pains have been bestowed on the tinting of his plates, but there is a mistake in supposing that the glossiness of surfaces can

be shown by varnishing, as, for instance, the pleural surface of the lung; yet, taken altogether, we must admire his powers of displaying diseases.

There are numerous publications, by well-known pathologists now living, who have enriched our pathology by their graphic contributions.

It is unnecessary to occupy the time of this meeting by an extended notice of engravings, which, although masterly in their execution and illustrative of the letter-press, still would prove, on comparison, inferior to the drawings from which they were copied.

Every one must view with great pleasure the collection in the museum of Guy's Hospital, the most singular part of which is a series of well-executed pictures, by Chinese artists, presented to Mr. Calloway by the Rev. Peter Parker, a missionary in China, and Doctor of Medicine. These paintings are portraits of patients, with most extraordinary tumours, which the Rev. Dr. is said to have successfully removed. There are also 2894 drawings, showing disease in its progress, and in its secondary consequences. A great number of these are by the late Mr. Canton, but the remainder are by the present talented draughtsman, Mr. Hurst. These drawings often become a source of information and reference. To give an instance, there are drawings of the state of the tongue in scarlatina, and also in the various stages of gastric fever, which are very striking. Others show, with great exactness, the several affections of the alimentary canal, or the appearance of the stomach after taking fatal doses of the corrosive poisons.

The magnificent collection in University College, London, is by Dr. Carswell, and forms some of the most valuable folios of morbid illustrations. These drawings, amounting to more than three thousand, are distinguished by a most masterly touch, and a singular purity and intensity of colouring.

There are a diversity of methods for producing pathological drawings, some of which I now place before you. The style which I prefer has been lately introduced. It consists in the free use of *opaque colours,* particularly by painting in the lighter parts, by which means we can again and again alter and correct until we bring the drawing to our mind. Those who have been so fortunate as to have the opportunity of visiting the exhibitions of pictures in

water colours, must have observed the forcible effects of this style. While endeavouring to prove pathological drawing easily attainable, I would likewise add, that it is the most economical means—indeed, it is almost the only means—which a private practitioner has of obtaining an *extensive* collection of morbid memorials.

Moreover, were medical pupils taught to paint the objects of anatomical and pathological demonstration, it needs no argument to prove that those objects would be more firmly fixed on their memories. A professor of medical drawing might be attached to each school of medicine, who should not only be competent to instruct in this sort of drawing, but also be able, from time to time, to examine his pupils as to their progress in linear explanation, and expect of them figures to express the primary or more complex appearances of both normal and abnormal structures. I would, therefore, earnestly propose that *pathological drawing* should be considered an important element in medical education. Abundant opportunities will offer for the formation of a *museum pathologicum*, which might be placed on the library table.

I have now only to request you to call to mind the development of pictorial art within our own recollection, and how diligently it has been concentrating the scattered remains and the genius of all who have lived before us, and applying them to its own purposes. It is now combining the taste, the intellect, and the knowledge that marked the Grecian and Roman ages, with all the accuracy and effect produced by the old masters, together with the keen perception and beautiful execution of modern artists. Hence you may conceive how well it is adapted to the representation of nature.

Landseer in his peculiar line has given us an example of what the pencil can accomplish. With a correct outline, and with purity of colouring, he has completely succeeded in painting *textures*. The fleece of the sheep, the wiry hair of the terrier, the sleek coat of the well-groomed horse, or the plumage of his birds, *cannot be mistaken*. They are to the life. A similar style and excellence is to be aimed at in pathological painting, and it is not going too far to predict that the period will soon arrive when it will be so advanced in its fidelity of expression, as to merit the same degree of commendation.

In taking, however, a more comprehensive view of our subject,

there will *often* require a combination of means in order to render the memorial of the fatal effects of disease complete. With the verbal account there must be both a drawing and a preparation. Thus in a case of inflammation of the theca of the spinal cord, which is preserved in the anatomical museum at Cambridge, a drawing of the vascular state of the arachnoid is annexed to the description, and a beautiful preparation of this thickened membrane, *in situ*, can be viewed in spirit.

The fine arts have always had their singular fascinations, but they have their faults and failings. In times past they were devoted to superstitions, or too exclusively connected with the elegances and refinements of decoration; but when knowledge had shown its more abundant stores, events, places, and things worthy of being treasured in our memories, required their use for better purposes. The taste for mythological fable has yielded to the genius of Hogarth and Wilkie, who created a deeper sensation by expressing the sober realities which presented themselves to observation. The time has arrived when the fine arts extensively minister to the information and welfare of society, and might still further be employed in the study of pathology and practical medicine.

Gentlemen, I leave you to compare the various means for the registration of pathological science. You will adapt them to your own taste and appliances, and I beg you to accept my acknowledgments for your patient attention to this communication.

[This paper was illustrated by a series of singularly beautiful and accurate drawings of various pathological specimens.]

APPENDIX

TO AN EXPERIMENTAL INQUIRY

INTO THE

EFFECTS OF HYDROCYANIC ACID

UPON ANIMAL LIFE.

BY THOMAS NUNNELEY, ESQ., F.R.C.S.E.

I had, while making the observations upon the effects of hydrocyanic acid when administered to living beings, originally intended, among other modes of giving it, to have injected it into the blood; but on seeing that the blood of animals who had been poisoned by it, as well as blood to which the acid had been added external to the body, did not, so far as could be judged of either by the naked eye or by the microscope, in its physical or vital properties differ in any essential particular from healthy blood, this mode of introducing it appeared to be of less importance. However, on reflection I could not but regret that I had not done so, as by it might be elucidated more than one interesting fact, as well as, possibly, the confirmation or disproof of the opinion I had arrived at, from previous experiments, as to the annihilation of the circulation, and the dependance of this upon a persistent contraction of the left ventricle of the heart. The being unable at the time to procure a supply of dogs, which, of all animals, are on many accounts the best adapted for this kind of experiment, and the printing of this volume of *Transactions* at an earlier period than hitherto has been usual, must be accepted as my excuse for the non-incorporation of the following experiments and observations in the body of the paper.

What I more particularly wished to ascertain was, if there were any essential difference in the effects produced by the acid when injected into the blood from those produced by it when introduced into the system by any other means; the comparative intensity and rapidity of its action when so introduced, and its effects upon the blood if it pass into the general circulation; if it enter, in how short a time its presence can be detected in a distant blood-vessel; and whether, if it be found in the blood, the quantity of it progressively, within a certain time, increases. Lastly, it seemed desirable to ascertain if the acid is readily carried off by any of the secretions, as the urine, a mode by which some of the mineral poisons, and many other materials, appear to be carried out of the system. As before, I shall relate the experiments, and then offer a few observations upon them.

No. 142.—A young, but full-grown, male cat. In order to ascertain the direct effect of the acid upon the circulation, I endeavoured to inject eight minims of acid with one drachm of water into the right femoral vein, without having first secured it by ligature. On the vein being opened it bled so freely that, with this and the violent struggling of the animal, I was by no means certain that the acid entered the vein, or did not pass into the cellular membrane along the course of it, especially as some force was required to make the injection pass: in one minute he became convulsed, and passed both fæces and urine, after which he lay paralyzed, with sensation and reflex action lost. As soon as the acid began to affect him the hæmorrhage ceased, and though the vein was not in any way secured no more blood escaped. One hour, has lain breathing feebly, but without any other motion; on the eye being now touched he became convulsed: one hour and a-half, has been many times convulsed, and there is now some reflex action, but no indication of sensation; laid in a warm place before the fire: two hours and a quarter, has gradually improved; the convulsions have continued, and in the intervals there is now some indication of sensation, also there is more power. Next morning he was found dead, lying in exactly the same place he had been left in; he had been freely purged. This cat, to all appearance, was quite as likely to recover when left for the night as several of those which did recover, nor did he at any time

exhibit such an utter loss of power as some others did. On examining the limb the effusion of blood along the vein was so great that I could not find the opening, which was very small, in it. The length of time before he was affected, compared with the time in which the dogs were affected, when the large dose is considered, conjoined with other things, render it, I think, far more probable that the acid passed along the outside of the vein than that it entered it. This experiment may, therefore, be taken as an illustration of the effects of the poison when injected into the cellular tissue.

No. 143.—Small young mongrel dog, not more than ten or twelve months old. The neck having been shaved, and the left *external* jugular vein exposed, a ligature was placed round it to prevent any escape of blood, and immediately two minims of Scheele's hydrocyanic acid, mixed with thirty minims of tepid water, were, by means of a fine syringe (holding exactly this quantity,) provided with a long fine nozzle, which was introduced into the vein through a small opening directly below the ligature, injected in the direction of the heart; the vein being immediately secured not a drop of blood was lost. In twelve seconds he became rigid, with hurried respiration; the eyes very prominent and the pupils intensely dilated; he fell and lay until two minutes, when he turned round and raised himself on his fore legs, upon which he supported himself: seven minutes, got up, walked steadily away, and passed the fæces with much voluntary effort, having done which he walked under the table to a corner, where he sat, appearing perfectly well, except weak and indisposed to move. When No. 144 was laid down, after having had the acid, he came and smelt at him, and in a few minutes ran briskly about the room, where he found a dry human sternum, which he immediately began to knaw most vigorously. This dog did not lose sensation, nor was he completely paralyzed.

No. 144.—A full-grown, rather small, mongrel terrier, (very dull and sulky.) Five minims of acid, with thirty minims of tepid water, were injected into the right *external* jugular vein in the same manner as in the last dog. In twelve seconds he became affected, breathing hard; he fell and howled loudly: in one minute he passed water *very* copiously: five minutes, has raised his head and looked about him, but is unable to sit: seven minutes, set

upon his legs in a very awkward position, in which he stood without making the least effort to alter it: thirty minutes, able to walk to a wall, against which he supported himself, but on being taken from it he was able to run about briskly and steadily.

No. 145.—Full-grown, active, strong, rough-haired terrier, with a cross of bull dog. Eight minims of acid, with thirty minims of tepid water, were injected into the right *external* jugular vein, in the same manner as in the other dogs: in ten seconds the breathing became affected, and in twenty seconds he passed urine, howled, and on being released fell: seven minutes, passed fæces; heart now beating eighty per minute, very irregularly, but with tolerable power: eight minutes, made great efforts to get up, but was unable to do so: at nine minutes he licked his foot, which had been wetted, then got up and walked very staggeringly away: seventeen minutes, has been repeatedly purged, and now walks about wagging the tail, and desires to be noticed: thirty minutes, seems as well as ever, looking about for something to eat. These dogs were all evidently sooner affected than when corresponding doses had been given in any other way. The symptoms were not very intense; neither the rigidity nor convulsions were very great; the paralysis was not complete; the respiration was not so much affected as it often is, nor was the heart's action so much disturbed; neither sensation nor reflex action were lost, and all these dogs recovered completely in a shorter space of time than I have usually seen.

No. 146.—Same little dog as No. 143, four days after last experiment, having been since perfectly well. Gave two minims of the same acid by the mouth: forty-five seconds, fell convulsed; up to this time he had been running actively about the room, raising himself upon his hind legs for the purpose of being patted by the lookers on; lay until four minutes, when he raised himself upon the fore-legs, but immediately fell: twenty-five minutes, has gradually improved, and is now busily employed in licking from the floor bits of grease, which had dropped from a candle: thirty minutes, perfectly well; urine, but not fæces, was passed; sensation was nearly, but not altogether, lost; neither the convulsions nor paralysis were extreme. This dog's stomach was very full of pieces of sheep's lungs, (given him unknown to me not very long before;) these he vomited soon after the acid had been given, and

his first object as he recovered was to eat the whole again. It did not appear to produce any effect; indeed, I doubt whether, when only two minims of acid are given, if any of it reaches the stomach.

No. 147.—Same dog as No. 144, four days having elapsed: he has continued as he was before the first experiment, very dull and stupid, and has eaten but very little. Two minims of acid, with thirty minims of tepid water, were injected, in the same manner as before, into the left *internal* jugular vein: in fifteen seconds breathing became hurried, and he fell: one minute, passed both fæces and urine: four minutes, has laid perfectly still, sensation and voluntary motion being lost, but reflex action continues; the urine must be secreted rapidly, as he has again passed an enormous quantity: twelve minutes, appears perfectly sensible, noticing what is going on, but he is unable to rise: fifteen minutes, is now able to walk away. This dog did not stir while the vein was being opened, nor was there the slightest motion when the acid was injected.

Two ounces of urine, passed at three minutes and a-half after the acid had been injected, was collected; by the nitrate of silver test it showed faint traces of the acid.

These experiments were made with the remainder of a little of the acid employed in some of the previous experiments; as it appeared from the effects very probable it had lost part of its strength, from having been repeatedly opened, the following were made from a fresh bottle of Allen and Co.'s acid:—

Twenty-four hours after (with the fresh acid) I made the same experiments upon the two dogs, only reversing the dogs; that to which the acid had last night been given by the mouth, had it to night injected into the vein, and that which had it by injection last night, had it by the mouth on this occasion.

No. 148.—The young dog, (Nos. 143 and 146.) Two minims of acid, with thirty of water, were injected into the right *external*, jugular vein: it almost immediately became affected and fell convulsed, but lost neither motion nor sensation, and in four minutes had nearly recovered, when two minims of acid were put into the mouth: in one minute afterwards it became very rigid and vomited, then was perfectly paralyzed, and in four minutes was dead.

No. 149.—Same as Nos. 144 and 147. Gave two minims of

acid by the mouth. It was affected in a similar manner as last night, after the acid had been injected into the vein, (and the acid used then contained less of the anhydrous acid,) but in a decidedly less degree; it was soon well again.

No. 150.—Same dog as last, (No. 149,) seven days after the last experiment: he has remained very dull and stupid, but has eaten rather more; (he was, before the first experiment, in the same mood, and made many determined attempts to escape;) had given to him ten minims of acid by the mouth, for the purpose of ascertaining if the acid could be traced in the urine: he was affected in the usual manner, and was dead in six minutes. He passed the water in three minutes after the acid had been given, but not nearly so copiously as on the two previous occasions. The urine was received as it flowed into a small jar, and immediately examined by Mr. West; but neither the iron or nitrate of silver test, before nor after distillation, revealed the least trace of hydrocyanic acid.

No. 151.—Same dog as No. 145, five days after last experiment, the dog having remained since that time perfectly well. The left *internal* jugular vein having been tied, four minims of acid, with thirty minims of tepid water, were injected into it immediately below the ligature, and the vessel secured below the opening, not a drop of blood being lost. The vein was now opened *above the first* ligature: in fifteen seconds six drachms of blood were received into a small jar; again in thirty seconds; and in one minute, other six drachms in a third jar; this flowed very slowly, and no more could be obtained *above* the ligature. Both ligatures were now removed, and at two minutes, and again at three minutes, other portions, each about an ounce and a-half, were received in separate jars. The circulation had become so arrested, although the heart could be felt beating, that in order to procure the latter quantities it was necessary to enlarge the wound considerably, even down to the junction of the jugular with the subclavian vein, and to favour the escape of the blood by a depending position. A portion of glass moistened with a minute quantity of pure solution of nitrate of silver, was placed over each jar: in a few minutes each glass, but especially the last taken portion, showed a ring of the white cyanide of silver, which, on being subjected to the blow-pipe, left upon the glass a coating of metallic silver.

The heart ceased to move in about five minutes, after which ten

ounces of blood were taken from the large vessels and given to Mr. West, who intended to have distilled a portion; but, in consequence of the mouth of the retort becoming obstructed by the coagulated blood, nothing came of the attempt.

Though I had intended to take all the portions of blood from above the ligature, where necessarily only that which had passed through the lungs and general circulation could escape, and fully believe that the blood received in the three first jars did flow exclusively from above the upper ligature, yet as some might entertain doubts, and incline to suppose that even these specimens might contain a portion of blood which had regurgitated, I made the following experiment, where no such supposition could by possibility be entertained.

No. 152.—An active, rather large, full-grown terrier dog had injected into the *left external* jugular vein six minims of acid with thirty minims of tepid water: he was affected in ten seconds, and the heart ceased to beat in six minutes. Six drachms of blood were taken in separate jars from the *right external* jugular vein at the following times after the acid had been injected:—at thirty-five seconds, at one minute, at one minute and a-half, at two minutes and a-half, at four minutes, at six minutes, at ten minutes, at eighteen minutes, and at thirty minutes. The first three portions escaped freely, the three next, especially those at four minutes and a-half and six minutes, more slowly, and the time named is the medium time, as the six drachms occupied some space on each side that noted. Those at ten minutes and eighteen minutes passed rather more freely, and at thirty minutes no more could be collected. The body was now opened, and the inferior cava and internal iliac veins were divided, (at thirty-five minutes after the acid had been injected,) and about an ounce and a-half collected; and, lastly, at forty minutes from the *right* ventricle and auricle, which were moderately distended, nearly another ounce and a-half were taken.

No urine was passed by this dog; the bladder contained at least an ounce and a half. This viscus was opened at thirty minutes after the acid had been injected, and the urine taken out.

This experiment was made thus:—the external jugular vein of each side was exposed, the opening on the right side being somewhat higher in the neck than that on the left, in order to avoid

the possibility of direct communication by anastomosis, a single ligature was placed under that on the right side, two were put under the left vein, the upper of which was tightened, the vein opened, the injection made towards the heart, and the lower ligature immediately tied, not a drop of blood having escaped. The ligature on the right vein was now tied, and an opening made in the vein above it, the opening being closed from time to time by the finger.

The urine was immediately examined by Mr. West, but did not yield with the nitrate of silver nor the sulphate of iron, the least trace of hydrocyanic acid.

The different jars containing blood had each placed over them a piece of glass moistened with a small quantity of pure solution of nitrate of silver. In a short time all except the first (that taken at thirty-five seconds after the acid had been injected,) showed a ring of the white opaque cyanide of silver; the third (that drawn at one minute and a-half,) more decided than that taken at one minute; the others presented nearly the same appearances, except the two larger quantities, (that from the inferior cava and that from the right side of the heart,) which showed a more decided and thicker film than the others. Twelve hours after; in all the film was greater and more decided, and even No. 1 presented a very thin white circle, which I believe was the cyanide, but it was not sufficiently decided to speak in very positive terms about.

The deposits were exposed to a flame and blow-pipe; in each, except No. 1, a white shining metallic looking substance was the result. A cyanide of silver was made by holding a drop of the same solution of nitrate of silver over a weak solution of hydrocyanic acid; it was then exposed to the blow-pipe flame. The only difference between this and those was, that this was somewhat denser, as, indeed, from the greater quantity of cyanide, was to be expected. At Mr. West's suggestion, a small quantity of the solution of nitrate of silver was dried, and subjected to the blow-pipe flame. As before, a firm coating was left on the glass, but which differed from that left by the cyanide in not being quite so shining, and was of a darker colour, having brown spots in it. I am not sufficiently versed in the use of the blow-pipe to be able to give any opinion as to the probability of these being distinctive

marks between the cyanide and nitrate of silver when subjected to the influence of heat. If it should turn out to be so, the fact will be a very useful one, (and the suggestion belongs to Mr. West,) for such very minute portions of the cyanide as were here subjected to its action it would be almost impossible to analyse in any other method; at least, I must confess to know of none. It may, perhaps, be proper to mention that the nitrate of silver is a test of far greater delicacy for hydrocyanic acid than the sulphate of iron. I have seen, in two portions of the same fluid, the nitrate of silver throw down the cyanide, while no indication was afforded by the sulphate of iron. This is especially the case should the fluid happen to possess (as urine,) a yellow tinge, which appears to mask, in some degree, a feeble blue tint.

These experiments sufficiently prove, I think, that hydrocyanic acid does not produce any other effect when injected into the blood than when administered in any other way, the only difference being a somewhat speedier effect, and also, I think, somewhat more decided, so that probably a rather smaller quantity would destroy life by injection than when applied upon a membrane, though when all circumstances are taken into consideration I doubt whether absolutely the same quantity coming into *actual* contact, over an equally large surface, upon a mucous membrane, whether alimentary, respiratory, or even the conjunctiva, would not produce, if not as speedy, at least as decisive effects as when injected into the blood. They also confirm what has been stated at pages 67 and 68, as to the acid not acting upon the structure of the blood, for here not any difference could be seen in the characters of the blood; its colour and coagulation was as usual.

That the acid is rapidly carried throughout the vascular system is decidedly shown by the last experiment; for though we might, to avoid the possibility of dispute as to the blood having actually passed the circuit of the lesser and greater circulations, not rely upon experiment 151, where the blood was taken from the same vein, though I have no doubt of the correctness of it, experiment 152 is conclusive upon the question. Here we have positive proof of the presence of the acid in the opposite jugular in one minute after its injection, if not in fifty-five seconds, as those who witnessed these experiments fully believe; and short as the time appears, it

is long when compared with what Hering states he found in his experiments to be required for detecting the presence of ferrocyanate of potass in the jugular vein of a horse after it had been injected into that on the opposite side, which he states to be from twenty to thirty seconds.* Now the heart of the horse does not in health pulsate more rapidly than from thirty-six to forty times per minute, while that of the dog beats about ninety-five times; so that, supposing other things be equal, the blood in the latter ought to circulate with at least double the rapidity which it does in the former.

I was anxious to ascertain if the successive portions of blood contained a progressively increasing quantity of the acid, and also if the blood flowed more rapidly, or even continued to flow as rapidly as on the first opening of the vein; because if this were so, it would tend to disprove the correctness of the opinion I have given at pages 72, 76, and 77, as to the condition of the heart, especially of the left ventricle, and the suspension of the circulation. However, these experiments fully confirm the deductions which I had drawn from the previous experiments and *post-mortem* examinations. Experiments 151 and 152 show that, even with such large veins as the internal jugular in No. 151, and the external in No. 152, opened in convulsed and struggling dogs, in the space of a minute, and a minute and a-half, the blood almost ceased to flow. So also in the cat, No. 143, where I am doubtful as to the acid being injected into the vein; in him, the blood was escaping very freely from the femoral vein until symptoms of the acid taking effect were shown, when all hæmorrhage immediately ceased, which, I apprehend, could only have occurred from the pressure of the approaching column of blood (*vis a tergo*,) being destroyed, from the left ventricle ceasing to propel any into the aorta.

The evidence is against the presence of hydrocyanic acid in the urine, for though there appeared to be faint traces of the acid in the urine in No. 147, yet no traces were detected afterwards in the urine of the same dog, No. 150, voided three minutes after a full

* *Müller's Physiology*, by Baly, vol. i., p. 186. I confess to entertaining some suspicion of error in the experiments of Hering, as the rapidity he gives is too great to be easily reconciled with the size of the heart's cavities, the quantity of blood, and the frequency of the pulse.

dose of the acid had been given by the mouth, nor in No. 152, where the urine was taken from the bladder thirty minutes after the acid had been injected into the blood, and the presence of which was proved in the blood which had circulated through the body. I should rather rely upon these two experiments, which were carefully made, and conclude that what was supposed to be a faint trace in No. 147 arose from some other cause than hydrocyanic acid, possibly ammonia.

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IS DIRECTED.

1st.—Collection of useful information, whether speculative or practical, through Original Essays, or Reports of Provincial Hospitals, Infirmaries, or Dispensaries, or of private practice.

2nd.—Increase of knowledge of the Medical Topography of England, through statistical, meteorological, geological, and botanical inquiries.

3rd.—Investigations of the modifications of Endemic and Epidemic Diseases, in different situations, and at various periods, so as to trace, so far as the present imperfect state of the art will permit, their connections with peculiarities of soil or climate, or with the localities, habits, and occupations of the people.

4th.—Advancement of Medico-Legal Science, through succinct reports of whatever cases may occur in Provincial Courts of Judicature.

5th.—Maintenance of the honour and respectability of the Profession, generally, in the Provinces, by promoting friendly intercourse and free communication of its Members, and by establishing among them the harmony and good feeling which ought ever to characterise a liberal profession.

THE LAWS

OF THE

PROVINCIAL MEDICAL AND SURGICAL ASSOCIATION.

1st.—That a Provincial Medical and Surgical Association be formed.

2nd.—That the Association be managed by a President, a President of the Council, Secretary or Secretaries, and Council.

3rd.—That the several Officers be appointed annually, by a General Meeting of Members convened for that purpose, at whichever of the principal towns may be appointed; the place of such Meeting being prospectively notified each year.

4th.—That at this Meeting shall be presented a Report, prepared by the Secretary or Secretaries, of the general state of the Association, its proceedings, and pecuniary accounts; the Report to be afterwards printed, and a copy supplied to every Member.

5th.—That at this Meeting one of the Members shall be appointed to give, at the next Annual Meeting, an account of the state or progress of Medical Science during the last year; or an Oration on some subject connected with Medical Science; or a Biographical Memoir of some eminent cultivator of Medical Science, who may have resided in the Provinces.

PRESIDENT OF THE ASSOCIATION.

6th.—That the office of President be honorary, and conferred on some senior Physician or Surgeon of eminence, resident in any of the provincial towns comprised in the circle of the Association.

OFFICERS AND COUNCIL.

7th.—That the Secretary or Secretaries be resident in Worcester, the place of publication, the duties being to attend to the printing of the *Transactions*, and to correct the press; to be present at the meetings of the Council, and to keep the minutes thereof; to correspond with the Members of the Association; and to receive and submit to the Council all papers transmitted for publication.

8th.—That the Council consist of a President and —— Members, to be selected from the principal provincial towns. The Council, with whom must rest the chief responsibility of publication, to have full power of deciding on all papers transmitted; and the consent of three of its Members must be obtained before any paper can be published. It shall also be the duty of the Council to receive the subscriptions, when due, in their respective districts.

9th.—That the President of the Council be also the Treasurer of the Association, and keep the financial accounts.

REGULATIONS OF THE DISTRICT BRANCHES.

10th.—That Members of the Association be at liberty to form District Branches wherever it may suit their convenience.

11th.—That in order to facilitate the formation of such Branches, and maintain uniformity amongst them, the General Council provide suitable instructions for the guidance of those who may unite in instituting them.

12th.—That conformity with these instructions be further ensured, by the initiating proceedings and organization of each Branch being submitted to the General Council for their revision and approval.

13th.—That the District Branches be free to govern themselves as their respective Members may think fit; but that the by-laws ordaining the special government be submitted to the General Council previously to their taking effect, in order to guard against the possibility of any such by-laws contravening the fundamental laws of the Association.

14th.—That the District Branches be empowered to present for election such of their Members as it may be deemed advantageous to the general and local interests of the Association to place on the General Council.

15th.—That the expenses incurred by the District Secretaries in conducting the proceedings of the District Branches be defrayed from the general fund, provided such expenses do not, in any instance, exceed one-seventh part of the guinea subscribed by each Member enrolled in the District Branch.

16.—That if any circumstance arise in the formation of District Branches which calls for a larger expenditure than what is allowed by the foregoing resolution, such expenses, provided they do not exceed one-fourth of the guinea, may be allowed by a statement of the circumstances being made known to the General Council.

ELECTION OF MEMBERS, ANNUAL MEETINGS, &c.

17th.—That each Member, on applying for admission, be nominated by two Members, as a pledge of eligibility.

18th.—That at each Annual Meeting the place of meeting for the ensuing year shall be announced.

19th.—That any Member wishing to propose a new law, or an alteration in an existing law, must send notice of his intention to the Secretary or Secretaries three months previous to the Anniversary Meeting, which will be circulated with the Report of the Council.

20th.—That the Association appoint Honorary Members at the Anniversary Meetings only.

21st.—That the Association appoint Members in foreign countries, to be styled "Honorary Corresponding Members," from whom communications, respecting the state of medicine in those countries, are expected to be received.

BENEVOLENT FUND.

22nd.—That a Medical Benevolent Society, under the restrictions proposed in the Report of the Committee presented to the Anniversary Meeting at Oxford, be connected with the Association.

PAYMENT OF SUBSCRIPTIONS, &c.

23rd.—Each Member of the Association to pay one guinea admission, and the same amount annually afterwards; the subscription to commence from the 1st of January each year, and to be considered as due, unless notice of its being withdrawn be given to the Secretary or Secretaries antecedently to the year for which it would be payable; for such subscription each Member shall receive a copy of each and all publications issued for the general use of the Members of the Association.

24th.—That those Members who have not an opportunity of paying their subscriptions to a Member of the Council resident in their district, are requested to pay it through the medium of their own bankers, to Messrs. Robarts and Co., London, for Messrs. Berwick and Co., Worcester, to the credit of the Association, or by a Post-office Order, sent to the President of the Council or the Secretary, which mode of remittance is specially pointed out, from being found the most convenient in conducting the business of the Society.

25th.—That all Papers and other communications be addressed to the Secretary or Secretaries, at Worcester, and forwarded carriage free.

26th.—That Messrs. Berwick and Co., Old Bank, Worcester, be the Bankers of the Association.

ROBERT J. N. STREETEN,

SECRETARY.

RULES

OF

THE BENEVOLENT FUND

OF THE

PROVINCIAL MEDICAL AND SURGICAL ASSOCIATION.

Before specifying the Rules which are to direct the proceedings of this Society, it is proper to repeat, in this place, the main principles on which it is established. It is not intended either to be a Benefit Society, or an Assurance Club; but, strictly speaking, a benevolent or charitable institution, founded and promoted for the express purpose of assisting our professional brethren, when struggling under the pressure of disease or other calamities. It is likewise proposed, under circumstances of peculiar urgency and distress, to administer relief to the widow or family of a professional man, who may have been deprived of the support and protection of a husband or parent. While, therefore, the sole design of this Society is to hold out the hand of charity and benevolence to a suffering and afflicted brother, or his family, it will not countenance improvidence or idleness, or evil habits of any kind.

The principle above stated has received the sanction of three successive meetings of the "Provincial Medical and Surgical Association;" and the following resolutions were finally adopted at the Anniversary held at Manchester, on the 20th and 21st of July, 1836:—

1. That a charitable fund be created by donations and subscriptions of members of the Association, to be called "The Benevolent Fund of the Provincial Medical and Surgical Association."

2. That contributions be received from all persons friendly to the objects of the Society, though belonging neither to the Association nor to the profession.

3. That the object of the fund be the relief of medical men* under severe and urgent distress, occasioned by sickness, accident, or any other calamity.

4. That any medical man labouring under such afflictions be considered a fit object for the charity.

5. That the claims of contributors shall, as far as possible, have the preference; but that contributions to the fund give no claim of right to relief, the fund being one of pure charity, and that each case be judged according to the urgency of the distress.

6. That under circumstances of peculiar emergency, relief may be extended to the widows and orphans of medical men, it being understood that it is not the design of this fund to relieve medical men from the necessity of providing for their families by ordinary life insurances, and such other means as prudence dictates.

7. That the management of the fund be conducted by Committees of the contributing members, annually appointed; the Central Committee to be at Cheltenham, and Local Committees, subordinate to the Central, in each of the principal cities and towns—the Central Committee having power to appoint Local Committees wherever they may be required.

All communications to the Central Committee to be addressed to the Treasurer and Secretary, Dr. Conolly, Castleton House, near Cheltenham.

* The Society will not acknowledge any one as a fit object of relief who has not received a regular professional education, and is not either a Doctor of Physic, or a Member of the College of Surgeons, or of the Apothecaries' Company.

NOTICES.

All Papers and other Communications to be addressed to the Secretary, Dr. Streeten, Worcester, and forwarded carriage-free.

Those Members who have not an opportunity of paying their Subscription, which becomes due on the 1st of January in each year, to a Member of the Council resident in their district, are requested to pay it, through the medium of their own Bankers, to Messrs. Robarts and Co., London, for Messrs. Berwick and Co., Worcester, on account of the "Provincial Medical and Surgical Association;" or they may remit the amount through the Post-office to either the President of the Council or the Secretary.

Gentlemen wishing to join the Association, are requested to apply to some Member of the Council in their immediate district; to Dr. Hastings, President of the Council, or to Dr. Streeten, Secretary, Worcester.

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